QUALITY ASSURANCE PROJECT PLAN

ALLIED PAPER - KALAMAZOO RIVER PROJECT
KALAMAZOO AND ALLEGAN COUNTIES, MICHIGAN

Prepared for:

U.S. Environmental Protection Agency
Region V
77 West Jackson Boulevard
Chicago, Illinois 60604

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LIST OF ACRONYMS

AOC	Administrative Order by Consent
ATV	All-terrain vehicle
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC/TR	Chain of custody/traffic report
CPR	Cardiopulmonary resuscitation
CRL	Central Regional Laboratory
DCN	Docket Control Number
DOT	U.S. Department of Transportation
DQO	Data quality objectives
EDD	Electronic deliverable document
EPA	Environmental Protection Agency
FIELDS	Fully Integrated Environmental Location Decision Support
FS	Feasibility Study
FSP	Field Sampling Plan
FSS	Field Services Section (of U.S. EPA)
GC/MS	Gas chromatograph/mass spectrophotometer
GC	Gas chromatograph
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
IATA	International Air Transport Association
in.	Inches
KRSG	Kalamazoo River Study Group
MDEQ	Michigan Department of Environmental Quality

MDNR	Michigan Department of Natural Resources
mg/kg	milligrams per kilogram
MS/MSD	Matrix spike/matrix spike duplicate
NIST	National Institute of Standards
OSC	On-Scene Coordinator
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated biphenyl
PE	Performance evaluation
POTWs	Publicly-Owned Treatment Works
ppm	Parts per million
PVC	Polyvinyl chloride
QA/QC	Quality Assurance/Quality Control
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
RAS	Routine Analytical Services
RI	Remedial Investigation
RPD	Relative percent difference
RPM	Remedial Project Manager
RSCC	Region V Sample Control Coordinator
RSD	Relative standard deviation
SAS	Special Analytical Services
SHSC	Site Health and Safety Coordinator
SOPs	Standard Operating Procedures
SOW	Statement of Work
START	Superfund Technical Assessment and Response Team
SWOK	Southwest Laboratory of Oklahoma
TDD	Technical Direction Document

TOC	Total Organic Carbon
WESTON	Roy F. Weston, Inc.

SECTION A

PROJECT MANAGEMENT

A.1 TITLE OF PLAN AND APPROVAL

Quality Assurance Project Plan
Removal Assessment
Allied Paper - Kalamazoo River Superfund Site
Kalamazoo and Allegan Counties, Michigan

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Approved by: ______________________ Date: __________
James M. Burton, P.E., Program Manager

Approved by: ______________________________ Date: __________

Sam Borries, U.S. EPA On-Scene Coordinator

Approved by: ______________________________ Date: __________

Tom Short, U.S. EPA Remedial Project Manager

A.2 INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA) requires that all environmental monitoring and measurement efforts mandated or supported by U.S. EPA participate in a centrally managed quality assurance and quality control (QA/QC) program. Any party generating data under this program has the responsibility to implement minimum procedures to assure that the precision, accuracy, completeness, and representativeness of its data are known and documented. To ensure the responsibility is met uniformly, each party must prepare a written Quality Assurance Project Plan (QAPP) covering each project it is to perform.

This QAPP has been prepared in accordance with "U.S. EPA - Region 5, Instructions on the Preparation of a Superfund Division QAPP, based on U.S. EPA QA/R-5, Revision 0, June 2000. As described in the instructions, this QAPP is organized into four Sections as described below:

- SECTION A: The elements in this section cover aspects of project managment, objectives, and history. This section identifies the roles and responsibilities of project personnel and describes the communication procedures. This section identifies the goal of the proposed removal assessment plan at the site.

- SECTION B: The elements in this section describe the design and implementation of measurement systems that will be used during the removal assessment action at the site. This section describes sampling procedures, analytical methods/procedures, and data handling and documentation procedures. Standard Operating Procedures (SOPs) for sampling and testing are referenced and included as attachments to this QAPP. Quality control procedures, frequency requirements, acceptance criteria, and corrective action procedures associated with all methods are also provided in this section.

- SECTION C: The elements in this section describe the procedures used to ensure proper implementation of Section B.

- SECTION D: The elements in this section describe the quality assurance (QA) activities that are expected to occur after the data collection phase of the removal assessment is completed.

A.3 DISTRIBUTION LIST

The distribution list is provided in Table A-1.

A.4 PROJECT ORGANIZATION AND RESPONSIBILITIES

Key personnel responsibilities are discussed in the following subsections. Figure A-1 presents the project organization chart.

A.4.1 Project Management

This project is a federal-lead project which is being coordinated by On-Scene Coordinators (OSCs) and U.S. EPA Remedial Project Managers (RPM) who have overall responsibility for all phases of this removal assessment.

Operational responsibilities involving execution and direct management of the technical and administrative aspects of this project have been assigned as follows:

A.4.1.1 Project Management Responsibilities

U.S. EPA On-Scene Coordinators– Mr. Sam Borries and Mr. Brad Stimple are the U.S. EPA OSCs for this project. Mr Borries and Mr. Stimple will work in conjuction with the U.S. EPA RPMs on this removal assessment project.

U.S. EPA Remedial Project Manager—Ms. Beth Reiner and Mr. Tom Short are the the U.S. EPA RPMs for this project. Ms. Reiner/Mr. Short has overall responsibility for all phases of the Allied Paper - Kalamazoo River Project, in conjunction with the OSCs.

U.S. EPA FIELDS Project Managers- Mr. Chuck Roth of the U.S. EPA Fully Integrated Environmental Location Decision and Support (FIELDs) group will be responsible for assisting with and identifying sample locations as well as determining which locations will undergo analysis.

State Project Managers—Mr. Brian Von Gunten of the Michigan Department of Environmental Quality (MDEQ) is the state Project Manager. The state Project Managers will be involved during all phases of this removal assessment.

WESTON Program Manager—Mr. Dean Geers is the WESTON Program Manager. The Program Manager has overall responsibility for the work assignment. The Program Manager is responsible for ensuring that the project meets all U.S. EPA and MDEQ objectives and quality standards. He is also responsible for ensuring that all work is executed in accordance with the U.S. EPA's technical directives. The WESTON Program Manager is responsible for assigning and monitoring the functions and responsibilities of the WESTON Project Manager. In addition, he will commit the necessary resources and personnel to meet the objectives of this removal assessment.

WESTON Project Manager—Mr. Richard H. Mehl, Jr., is the Project Manager. The Project Manager is responsible for implementing the project objectives utilizing the personnel assigned. The Project Managers primary function is to ensure that the technical, financial, and scheduling objectives are achieved successfully. The WESTON Project Manager will coordinate with the WESTON Program Manager, and Quality Assurance Manager and will be the major point of contact and control for matters concerning the project. His other responsibilities include:

- Coordination and management of project personnel.
- Project scheduling.
- Coordination and review of required deliverables.
- General QA of field activities.
- Represent the project team at meetings and public hearings.

A.4.1.2 Quality Assurance Responsibilities

U.S. EPA Field Services Section (FSS) Quality Assurance Reviewer--The U.S. EPA Region V Superfund FSS will be responsible to review and approve all QAPPs. The U.S. EPA FSS also has the discretion to conduct external performance and system audits of field and laboratory activities.

WESTON Quality Assurance Officer (QAO)—Ms. Linda Korobka is the WESTON START QAO. The WESTON QAO has the responsibility to implement and administer the WESTON START Quality Assurance Program. She is responsible for coordinating all procedures and tasks pertaining to QA and reporting to the WESTON Program Manager on QA issues. Other duties include:

- Exercise overall responsibility for all audits under the START contract.
- Determine projects and activities to be audited.
- Establish audit schedules.
- Notify the audited entity of nonconformances and the need for corrective actions.
- Approve the disposition of nonconformances.
- Update and/or develop new SOPs in response to an observed need

WESTON Sample Management Coordinator and Data Validator– Ms. Tonya Balla is the WESTON Sample Management Coordinator. WESTON's Sample Management Coordinator will coordinate all Allied Paper - Kalamazoo River Project site sampling requirements and schedules with the U.S. EPA Region V Sample Control Coordinator (RSCC). Ms. Balla, in conjuction with the WESTON START QAO, will be responsible for performing analytical data review and data validation.

A.4.1.3 Field Responsibilities

WESTON START Project Leader/Field Team Leader– WESTON will designate a START Project Leader/Field Team Leader that will be responsible for the daily direction of the team members regarding the TDD-specific tasks. The START Project Leader/Field Team Leader will provide the initial technical review of all deliverables and data collection activities. In essence, this person will be responsible for the management of the field team and the supervision of all field activities in the absence of the WESTON Project Manager.

WESTON Site Health and Safety Cooordinator– WESTON will designate a person to be responsible for implementing the Health and Safety Plan. The SHSC will perform health and safety monitoring and ensure compliance with all health and safety requirements.

A.4.1.4 Laboratory Responsibilities

PCB samples will be analyzed through the U.S. EPA Contract Laboratory Program (CLP) by Southwest Labs of Oklahoma (SWOK) in Broken Arrow, Oklahoma under a flexibility clause to the CLP Scope of Work (SOW). Total Organic Carbon (TOC) samples will be analyzed by U.S. EPA Region V Central Regional Laboratory (CRL) in Chicago, Illinois. Dioxin samples will be analyzed by a SWOK under a U.S. EPA Region V Special Analytical Services arrangement between SWOK and U.S. EPA.

A.5 PROBLEM DEFINITION/BACKGROUND INFORMATION

A.5.1 Site Background/History

In the U. S., PCBs were produced as mixtures of PCB congeners for commercial purposes exclusively by Monsanto Industrial Chemicals Company under the trade name Aroclor. Although most PCBs produced in the U.S. were used in electrical components, they were also used for other applications including the manufacture of carbonless copy paper from 1957 through 1971.

PCBs have entered the Kalamazoo River by several routes including direct discharge such as wastewater effluent, indirect discharge through publicly owned treatment works (POTWs), and non-point source runoff from upland areas. Sources that contributed PCB to the river included paper manufacturing facilities that recycled paper between the late 1950's and early 1970's, and a variety of other industries that used PCB products.

Four separate areas adjacent to the Kalamazoo River and Portage Creek (tributary) were designated as operational units which include: Allied Paper, Inc. (Including former Bryant Mill Pond), Willow Boulevard/A-Site, King Highway Landfill, and the 12th Street Landfill. These areas had been used as disposal sites for paper-making residuals and were considered to be potential continuing sources of PCBs into the river and creek. Although carbonless paper was not manufactured in the Kalamazoo River basin, it was shipped to the area mixed with other office paper destined for recycling at the Kalamazoo River Study Group (KRSG) mills. The paper recycling process produced a waste stream containing PCBs (BBL, 2000).

In 1994, a group of four PRPs calling themselves the Kalamazoo River Study Group (KRSG) conducted a Remedial Investigation (RI) consisting of a sampling assessment of the Kalamazoo River from Morrow Lake to Lake Allegan (Phase 1 of the River) which included the current Site. The RI was conducted pursuant to an Administrative Order by Consent (AOC) issued by the Michigan Department of Natural Resources (MDNR). The purpose of the RI was to characterize the Site and the actual or potential hazards to public health and the environment, and to collect and analyze data to evaluate alternatives for the Feasibility Study (FS). The 1994 sediment sampling assessment included the collection of 1,076 samples which were analyzed for PCBs. Sample locations included instream sediment, exposed sediment, and floodplain soils. The surface area of the river and exposed sediments in former impoundments encompass 3,800 acres with an average of one core/grab sample per 3.5 acres of potentially contaminated material.

Forty-one samples were collected during the 1994 RI in the proposed sample area for this Removal Assessment Work Plan and upcoming sampling assessment. Concentrations in the samples collected ranged from non-detect to 74 ppm PCB. Thirty of the 41 samples were non-detect or less than 1 ppm PCB. Nearly all of the 6 in segmented core samples had a maximum sediment or soil depth of approximately 24 inches (BBL, 2000).

A.6 PROJECT/TASK DESCRIPTION AND SCHEDULE

A.6.1 FIELD INVESTIGATION

Samples will be collected from two preliminary site areas that are expected to be a representative cross-section of sediment type, flow characteristics, and histories. Section one is the area of the river from Main Street in Plainwell to the Plainwell dam (Figure A-2). The channel length is approximately 1.8 miles. Section two is the area from Plainwell dam to Otsego City dam which also has a channel length of approximately 1.8 miles. Sample locations need to contain all three substrates of concern including; in-stream sediment, exposed sediment, and floodplain soil (FIELDS, 2001). The project schedule is provided in Figure A-3.

FIELDS personnel will identify and flag all sampling locations and each sampling location will be located in real-time using a total station Global Positioning System (GPS).

A.6.1.1 Stage One - Grid and Transect Sampling

During stage one, approximately 120 locations will be sampled, 59 in section one and 61 in section two (Figure A-4). The number of samples will be proportional to each area sampled using a systematic grid in the floodplain areas and transects in the river and exposed sediments. Section one sample locations will be dispersed throughout a 300-foot grid in the floodplain with eight transects across the river within the section. Section two samples will be dispersed throughout a 500-foot grid in the floodplain with five transects across the river. At each location, a sample will be collected from one of three of the target substrates: instream sediment, exposed sediment, and floodplain soil using a core sampler lined with a Lexan tube. Instream sediment samples will be collected from the following intervals; 0-6 inches (in), 6-12 in, 12-24 in, and one-foot increments thereafter until refusal. Exposed sediment and floodplain soil will be collected following intervals; 0-6 in., 6-12 in., 12-24 in., 24-36 in., 36-48 in., and 48-60 in or until refusal or until native soil is visible. Each sample interval will be placed in a re-usable stainless steel bowl and homogenized. Samples will be placed into an 8-ounce clear wide mouth glass sample jar and a 4-ounce amber wide mouth glass sample jar with a teflon-lined cap and cooled to four degrees Celsius (°C). The 8-ounce sample will be analyzed for PCBs (aroclors) and the 4-ounce sample for total organic carbon (TOC). Twenty samples from the section one first interval (0-6 in) sample locations will be collected for dioxin analysis. The sample will be placed in a 4-ounce amber wide mouth glass sample jar with a teflon-lined cap, cooled to 4°C and analyzed for dioxins.

A.6.1.2 Stage Two-Radial Sampling

Stage two will implement a radial grid using an adaptive fill around selected "hot spots" (Figure A-5) determined from analytical results received from stage one sampling. Sampling will provide data for correlation analysis and to determine "hot spot" size. Four cluster areas will be collected, two for predominantly instream sediment and two for predominantly exposed sediment for a total of 256 sample locations. The radial clusters will likely encompass instream sediment, exposed sediment, and floodplain soil. Cores will be collected with predetermined distances of 5 feet (ft) 10 ft, 20 ft, 40 ft, 80 ft, 160 ft in each of eight directions (radially). Eight additional sample locations are located in both the 80-foot and 160-foot distances for a total of 64 locations on each cluster. At each location, a sample will be collected from one of three of the target substrates: instream sediment, exposed sediment, and floodplain soil. Instream sediment samples will be collected from the following intervals; 0-6 in, 6-12 in, 12-24 in, and one-foot increments thereafter until refusal. Exposed sediment and floodplain soil will be collected following intervals; 0-6 in., 6-12 in., 12-24 in., 24-36 in., 36-48 in., and 48-60 in. until refusal or until native soil is visible. Each sample interval will be placed in a re-usable stainless steel bowl and homogenized. Samples will be placed into an 8-ounce clear wide mouth glass sample jar and a 4-ounce amber wide mouth glass sample jar with a teflon-lined cap and cooled to four degrees Celsius (°C). The 8-ounce sample will be analyzed for PCBs (aroclors) and the 4-ounce sample for total organic carbon (TOC). FIELDS will flag or mark each location via GPS.

A.6.1.3 Sample Collection Procedure

Sample teams will collect instream samples in areas of the river with weak currents and shallow water (less than 3 feet deep) using waders and samples in areas with deeper water or stronger currents will require the use of a 12 -foot John-boat with a center sampling port equipped with a small motor. To obtain the instream sediment samples from the Kalamazoo River, a three-inch diameter core sampling apparatus constructed of polyvinyl chloride (PVC) with Lexan® tubing will be driven by hand until refusal. Samples will be collected from the following intervals; 0-6 in, 6-12 in, 12-24 in, and one-foot increments. Sample equipment will be decontaminated as outlined in the Field Sampling Plan (FSP). GPS positions (+/- 1 centimeter (cm) horizontal, +/- 2 cm vertical) will be taken for true elevation of each core (FIELDS, 2001).

An All Terrain Vehicle (ATV) or a four-wheel-drive truck, equipped with a hydraulically pressure driven soil sampler (Geoprobe®), will be implemented to obtain consistent core depths in floodplain soil, and exposed sediment to a depth of 60 inches or until refusal or until native soil is visible. The truck-mounted Geoprobe drives a 3-foot long, 3-inch diameter hollow sampling rod section into the ground by means of a motor-driven hydraulic hammer. Discrete samples are collected at desired depths. After the rod has been driven into the soil to the desired depth and the sample collected, the motor may be reversed to remove the sampling rod. The hollow rods are lined with a Lexan insert to collect samples and help preserve the cleanliness of the interior of the rod. After the rod has been extracted from the ground, the Lexan insert is removed and the sample is geologically logged, and samples are collected and preserved for laboratory analysis.

A hand-powered Geoprobe® unit or equivalent hand-powered probe will be used at locations that are inaccessible with the ATV-mounted or truck mounted Geoprobe®. The hand-powered unit consists of a 3-foot long, 2-inch diameter hollow sampling rod that is driven into the ground by means of a hand-driven lever and hammer system. Discrete samples are collected at the desired depths. After the rod has been driven into the soil to the desired depth and the sample collected, the rod is extracted by means of a built-in jack removal system. The hollow rods are lined with a plastic (Lexan®) insert to collect samples and help preserve the cleanliness of the inside of the rod. After the rod has been extracted from the ground, the Lexan insert is removed and the sample is geologically logged. The rods are decontaminated between sample locations.

A bucket auger may also be used to collect soil samples when soil conditions prevent use of the Geoprobe® sampler. The T-handled stainless-steel bucket auger is manually augered into the ground and soil enters the 2- or 4-inch diameter bucket sampler. The auger and discreet interval of soil is retrieved from the borehole in 6- inch sections. Discrete samples are collected at desired depths. The soil is geologically logged and screened for desired parameters. The auger and extension rods are decontaminated between sample locations.

FIELDS personnel will conduct a GPS survey of the boundaries of the exposed sediments and flood plain which are needed for volume determination and interpolation. A bathymetric survey, dependent upon water depth in the study area, will be conducted to give accurate elevations of cores for three-dimensional interpolations. If water levels are too shallow (under three feet) core locations will be determined using a total station GPS (1 cm accuracy) to give the necessary vertical accuracy. Sediment probes will be used to determine sediment thickness and estimate the total sediment volume. Probe locations will be predetermined based on a sampling grid and will be located in real-time using GPS (+/- 1 meter) (FIELDS, 2001).

A.7 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Each of the sample collection activities described in this Removal Assessment Work Plan address sample collection objectives outlined in the Draft Kalamazoo River 2001 Removal Assessment FIELDS Proposal (20 March 2001). Sample collection activities are structured to satisfy the five data collection objectives (FIELDS) listed below:

- Dynamics of PCB and River Sediment/Soil - This assessment will provide a more complete understanding of the relationship of PCBs and dioxins in the Kalamzoo River sediment/soil to promulgate the direction of future Kalamazoo River sampling and potential remediation activities.

- Provide Data for Comparison to 1994 Sampling Event - Sample collection and analysis will provide data for comparison between the 1994 sampling event and this removal assessment area.

- Removal Volume Estimation - This sampling event will refine the volume estimation of contaminated sediment. ~~to be removed from the assessment area.~~

- Delineation of Soil/Sediment Matrix - Sample analysis will determine the delineation and extent of contamination of sediments, exposed sediments, and floodplain soils.

- Provide Data for Cost Estimation - Data from analytical results will aid in the definition and evaluation of alternative remedies and provide criteria for a more refined cost analysis. ~~for the removal of contaminated sediment/soil.~~

The overall QA objective is to develop and implement procedures for sampling and analysis, and reporting that will provide results, which are of sufficient quality for their intended use and are legally defensible in a court of law. The quality of data obtained during the field activities will be measured in terms of analytical precision, accuracy, completeness, representativeness, comparability, holding times, and detection limits. Each of these objectives is described in more detail below.

A.7.1 Precision, Accuracy and Sensitivity of Analysis

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols. The accuracy and precision requirements for the PCB samples will be incorporated into the contract between the U.S. EPA and the laboratory (SWOK) under the flexibility clause of the CLP SOW Contract. The accuracy and precision requirements for the TOC samples are presented in Section 8 of the TOC SOP. The accuracy and precision requirements for the dioxin samples are presented in the analytical method (SW846-8290 - high resolution).

A.7.1.1 Precision

Precision is a measure of the agreement between multiple measurements of the same property carried out under similar conditions. Precision thus reflects the reproducibility of the measurement. Precision is evaluated most directly by recording and comparing multiple measurements of the same parameter made on the same sample under similar conditions.

Precision is expressed in terms of the relative standard deviation (RSD) of the values resulting from the replicate analysis or the relative percent difference (RPD) between the values resulting from duplicate analysis.

Duplicate precision is evaluated by calculating a RPD using the following equation (the smaller the RPD, the greater the precision):

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

A.7.1.1.1 Field Precision

Field precision will be assessed through the collection and measurement of field duplicates and matrix spike/matrix spike duplicates (MS/MSD) samples. Field duplicates will be collected at a rate of one per 10 investigative samples. One MS/MSD will be submitted with every 20 investigative and duplicate samples. The total number of duplicates and MS/MSD samples for this field program is presented in the FSP Table 2-1 and 2-2.

A.7.1.1.2 Laboratory Precision

Precision in the laboratory will be assessed through the calculation of RPD. Because the concentration of analytes may be below detection limits in many environmental samples, the RPD data will be generated by preparing MS/MSDs.

A.7.1.2 Accuracy

Accuracy is a measure of the agreement between an observed value and an accepted reference value. It is a combination of the random error (precision) and systematic error (bias), which are due to sampling and analytical operations. The laboratory and method accuracy are calculated as a percentage using the following equation (the higher the value, the greater the accuracy):

$$\text{Accuracy} = \frac{\text{Measured value}}{\text{True Value}} \times 100$$

A.7.1.2.1 Laboratory Accuracy

Laboratory Accuracy will be assessed through the analysis of MS/MSDs, laboratory control samples (LCSs), and surrogate spikes.

MS/MSDs are evaluated by analyzing a spiked and unspiked portion of the same investigative sample. The objective is to equal or exceed the accuracy demonstrated for the analytical method on samples of similar matrix, composition, and contaminant concentration. The level of recovery of an analyte and the resulting degree of accuracy expected for the analysis of QA samples and spiked samples are dependent on the sample matrix, method of analysis, and the contaminant. The concentration of the analyte relative to the detection limit of the method is also a factor.

The accuracy of the laboratory procedures is also evaluated by the analysis of LCS and laboratory control spike duplicate (LCSD) samples. The LCS/LCSD sample set consists of a clean matrix that is spike with known constituents. The LCS/LCSD set is prepared and analyzed along with the environmental samples. The LCS/LCSD set is indicative of the accuracy of the laboratory techniques without possible sample matrix interferences.

The accuracy of sample matrix data will be evaluated by determining the %R of matrix spike, and surrogate spike samples where applicable. The spike recovery is calculated using the following equation:

$$\%R = \frac{\text{Observed spike sample conc. - Unspiked sample conc.}}{\text{True concentration of spike}} \times 100$$

A.7.1.3 Sensitivity

Sensitivity is the ability of the method or instrument to detect the contaminant of concern and other target compounds at the level of interest. Sensitivity is typically expressed in the form of detection limits.

A.7.2 Completeness, Representativeness, and Comparability

A.7.2.1 Completeness

Completeness is a measure of the amount of valid data obtained compared to the amount of data that was planned to be collected under normal conditions. Field and laboratory completeness are a measure of the amount of valid measurements obtained from all measurements taken for the project. Valid data will be defined as all data and/or qualified data considered to meet the DQOs for this project. It is expected that the CLP will provide data meeting QC acceptance criteria for 95 percent or more of all samples tested (critical samples).

A.7.2.2 Representativeness

Representativeness is a measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. This is the degree to which samples represent the conditions for which they were taken.

A.7.2.2.1 Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the FSP is followed and that proper sampling techniques are used. The rationale for the sampling network and the sampling techniques are provided in the FSP.

Specific field procedures that will help ensure representativeness of specific samples includes:

- Collect samples representative of the entire sample interval
- Use appropriate sampling methodology and equipment
- Use appropriate sampling procedures, including equipment decontamination
- Perform sample procedures consistently and methodically

A.7.2.2.2 Measures to Ensure Representativeness of Laboratory Data

Using the proper analytical procedures, meeting sample-holding times, and analyzing and assessing duplicate samples ensures representativeness in the laboratory.

A.7.2.3 Comparability

Comparability is a measure of the degree to which one data set can be compared to another. Conditions of comparability include standardized siting, standardized sampling and analysis, consistency of reporting units and standardized data format.

A.7.2.3.1 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by adhering to the standard sample collection, standard analytical procedures, and standard reporting methods described in the FSP.

A.7.2.3.2 Measures to Ensure Comparability of Laboratory Data

The analytical data to be obtained during the sampling activities will be comparable to existing data by using similar sampling methods, analytical methods and QC objectives.

A.7.3 Levels of Quality Control Effort

To assess the quality of data resulting from the sampling program, field duplicates and MS/MSD samples will be collected and submitted to the analytical laboratory. QC samples will also be prepared and analyzed by the laboratory. Laboratory QC samples will include method blanks, laboratory duplicates, and laboratory control samples (as applicable).

A.7.3.1 Field Quality Control

Field duplicates will be collected at a frequency of one per 10 project samples per parameter. Field duplicates will receive a unique sample identification number and will be submitted to the laboratory as a "blind" duplicate to avoid laboratory bias. Field duplicates are analyzed to check for sampling and analytical reproducibility.

Matrix spikes provide information about the effect of the sample matrix on the preparation and measurement methodology. MS/MSD samples for organic analyses will be analyzed at a minimum of one per 20 investigative and duplicate samples.

Temperature blanks will be included in each cooler being shipped to ensure that the temperature in the cooler meets the specified requirements.

A.7.3.2 Laboratory Quality Control

The level of QC for PCBs will be a CLP QC level using the SW846-8082 method. This is being achieved by utilizing the flexibility clause that the CLP SOW allows. The level of QC for the dioxins will be consistent with method SW846-8290. The level of QC for the TOC will be consistent with the U.S. EPA CRL SOP for TOC.

A.8 SPECIAL TRAINING REQUIREMENTS/CERTIFICATION

Training of START members/field staff will be provided to ensure that technical, operational, and quality requirements are understood. All field team members, will receive training including but not limited to, the following:

- Logbook training- Training for the maintenance of field, equipment, and personal logbooks

- Health and Safety Training - All field staff will maintain health and safety training to ensure compliance with Occupational Safety and Health Administration (OSHA) as established in 29 CFR 1910.120 and 29 CFR 1910.126 (as applicable). This training includes but is not limited to, 40-hour OSHA HAZWOPER training, 8-hour annual HAZWOPER refresher training, 8-hour supervisor training, cardiopulmonary resuscitation (CPR), first aid training, blood-borne pathogens training, and hazardous materials shipping training.

- Data Validation Training - Team members who are responsible for an unbiased assessment of analytical data validation will be trained in accordance with the *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999.*

- Certifications - Team members will be encouraged to attain and maintain certifications required to conduct work within the START SOW.

- Other - The Project Manager will identify any other additional training for employees required to fulfill the START SOW.

All Health and Safety Training is documented by each WESTON office Health and Safety Officer and is accessible to the WESTON START Health and Safety Officer and the WESTON QAO. All other training will be recorded in a matrix to ensure appropriate frequency is achieved. All certificates and/or documentation that records completion of training will be maintained in personnel files.

A.9 DOCUMENTATION AND RECORDS

A.9.1 Project Documentation

Project information generated by START will be documented in a format that is usable by all project personnel. Project data and information will be tracked and managed from its inception in the field to its final storage area. These evidentiary files (relevant records, reports, correspondence, logs, field notebooks, pictures, subcontractor reports, data, etc) will be maintained by the WESTON Project Manager (and the WESTON QAO, as applicable) in a secured, limited access area. These files will be maintained for a minimum of three years after project closeout and will be offered to the U.S. EPA prior to disposal. Documents and records that will be managed include but are not limited to:

- Sample Collection Records - Logbooks, field notes, data collection sheets, chain-of-custody records, custody seals, sample tags, phone conversation records, airbills, nd corrective action reports.

- Project Data Assessment Records - Field sampling audit checklists, field analytical audit checklists, fixed laboratory audit checklists, performance evaluation (PE) sample results, data validation reports, phone conversation records, and corrective action reports.

- Laboratory Analytical Records - The analytical laboratory will be responsible for maintaining analytical logbooks, and laboratory data. Raw laboratory data files and electronic and hard copy data will be inventoried and maintained by the laboratory for the time period established by the U.S. EPA for the CLP. Laboratory data packages will contain the following information at a minimum: case narrative, calibration summary and raw data, mass spec tuning data (as applicable), gas chromatogram (as applicable), quality control summary forms and raw data, blank results, and method and instrument detection limits.

All incoming and outgoing correspondence or reports between WESTON and the U.S. EPA will be assigned a unique Docket Control Number (DCN). A DCN number is assigned to each individual document contained in the project file.

Table A-1

QAPP Distribution List
Allied Paper
Kalamazoo River Project
Kalamazoo/Portage, Michigan

QAPP Recipients	Title	Organization
Linda Korobka	START QAO	Roy F. Weston. Inc.
Rick Mehl	Project Manager	Roy F. Weston. Inc.
Sam Borries	On-scene Coordinator	U.S. Environmental Protection Agency (U.S. EPA)
Brad Stimple	On-scene Coordinator	U.S. EPA
Beth Reiner	Remedial Project Manager	U.S. EPA
Thomas Short	Remedial Project Manager	U.S. EPA
Chuck Roth		U.S. EPA FIELDS Group
Brian Von Guten	Project Manager	Michigan Department of Environmental Quality

SECTION B

DATA GENERATION AND AQUISITION

B.1 SAMPLING PROCESS DESIGN

B.1.1 Sampling Network and Rationale

The project objectives described previously will be accomplished by collecting samples in floodplain soil, instream sediment, and exposed sediment. The sampling locations and frequency will be contained in the FSP (Appendix A).

B.1.2 Parameters to be Tested and Frequency

Site-specific target parameters in floodplain soil, instream sediment, and exposed sediment samples have been identified in the work plan. Stage one sampling will include approximately 120 sample locations with samples collected at four different depths at each of those locations. All stage one samples will be analyzed for PCBs and TOC. PCBs will be analyzed through the CLP program under the flexibility clause of the CLP contract. A modified SW846-8082 will be used. TOC will be analyzed by U.S. EPA Region V CRL following their TOC SOP. This method is based on the Methods of Soil Analysis for Organic Carbon. Approximately 20 samples during the stage one sampling will also be analyzed for dioxin. Dioxins are being analyzed by SWOK (method SW846-8290), utilizing a U.S. EPA Region V Special Analytical Services agreement. Stage two sampling will only include PCB analysis.

B.2 SAMPLING METHODS REQUIREMENTS

Sample Collection Procedures for the various sampling activities are described in the Field Sampling Plan (FSP). The FSP describes in detail: (i) sampling equipment; (ii) support facilities; (iii) decontamination of the sampling equipment; and (iv) sample storage, preservation, and holding times. Quality assurance during sample collection shall be achieved by following the procedures described in the FSP.

B.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

B.3.1 Sample Containers and Handling

Table 7.1 of the FSP presents the required sample containers, sample preservation methods, and maximum holding times for the proposed environmental sampling. All samples will be placed in appropriate sample containers and labeled. The sample labels and sample tags will include sample number, location, date, and time of collection, and analyses to be performed. Tags will be provided by the U.S. EPA Region V RSCC. The labels and information for the sample tags will be created using the Forms II Lite software. Samples will be cushioned inside the shipping coolers using bubble wrap or vermiculite. The temperature of the samples will be maintained at $4 \pm 2\ ^\circ$ C with sealed plastic bags of ice.

Samples will be shipped via commercial air courier on a daily basis (as feasible) to the analytical laboratory. The exception to this procedure will be for samples, which are collected on a Sunday or a holiday. For samples collected on a Sunday or holiday, additional ice will be placed in the coolers or samples will be placed in a secure refrigerator. The coolers or refrigerator will be sealed and kept in a designated secure area until they are picked up by the courier on the next business day In addition, samples being analyzed by CRL will not be shipped on a Friday, Saturday, or Sunday, as they cannot receive shipments over the weekend.

Prior to shipment, two custody seals will be fastened to the right and left sides of each shipping cooler to secure the lid and provide evidence that the samples have not been tampered with en route to the laboratory. Upon the receipt of the cooler at the laboratory, the cooler will be inspected by the laboratory's sample custodian.

B.3.2 Documentation

Field efforts will be carefully documented using field notebooks, a Site logbook, field summary reports, sample chain-of-custody forms, sample labels, and custody seals. In addition, field copies of this QAPP, the FSP, the Work Plan and the Health & Safety Plan (HASP) will be kept on Site.

B.3.3 Field Log

A field logbook will be kept by the Field Team Leader to document site activities, field measurements, and interactions with subcontractors, sample information, descriptions of photographs, and other relevant information. The logbook will be a bound document with consecutively numbered pages. All entries will be made in ink with no erasures. If an incorrect entry is made, the information will be crossed out with a single strike mark, which will be initialed and dated by the person making the correction.

The following information will be recorded in the field logbook on a daily basis:

- Site location identification.
- Start date and time (in military time format).
- Weather conditions.
- Names of sampling team members.
- Site visitors.
- Level of personal protective equipment used.
- Signature.

When collecting environmental samples, the following information will be recorded in the field logbooks, on the sample labels, and on the sample tags:

- Unique sample identification number (discussed in the FSP).
- Date and time of sample collection.
- Type of sample collected.
- Samplers names.
- Analyses to be performed on sample.
- Preservatives used, especially any non-standard types, and any other field preparation of the sample.

In addition to the above information, the logbook will contain a detailed description of the sample location, and the samples physical characteristics (i.e. color, odor, etc).

B.3.4 Sample Custody–Overview

Sample custody is one of several factors necessary for the admissibility of environmental data as evidence in a court of law. Sample custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all originals of laboratory reports and purge files, will be maintained under document control in a secure area. A sample or evidence file is under custody if the documents:

- Are in the possession of the individual.
- Are in the view of the individual, after being in his/her possession
- Were in the possession of the individual before being placed in a secure location or are in a designated and identified secure area.

B.3.5 Chain-of-Custody Form

Chain-of-custody forms will be used to track all samples from the time of sampling to the arrival of samples at the laboratory. Every sample container being shipped to the laboratory will contain a chain-of-custody form. Forms II Lite software will be used to generate the chain-of-custody form. The sampler will maintain their copy while the other copies are enclosed in a waterproof enclosure within the shipping container. The laboratory, upon receiving the samples, will complete the remaining copies and keep one copy for its records.

B.3.6 Field-Specific Chain-of -Custody Procedures

To ensure that samples will arrive at the laboratory without breakage and with the chain-of-custody intact, the following sampling and packaging procedures will be followed:

- The field sampler is personally responsible for the care and custody of the samples until they are transferred to another individual or properly dispatched to the laboratory. As few people as possible should handle the samples.
- All sample containers will be labeled with unique sample numbers and sample locations.
- Sample labels will be completed for each sample using waterproof ink unless precluded by weather conditions.
- The field team leader will review all field activities to determine whether proper custody procedures were followed during the field work.

B.3.7 Sample Shipping Procedures

The following transfer of custody and shipment procedures will be followed:

- Samples will be accompanied by a properly completed chain-of-custody record. The sample numbers and locations will be listed on the chain-of-custody record. When transferring the possession of samples, the individuals relinquishing and receiving will sign, record the date, and time on the record. This record documents transfer of custody of samples from the sampler to another person, to the laboratory, or to/from a secure storage area.

- Samples will be properly packaged for shipment and dispatched to the laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be secured with custody tape and for shipment to the laboratory. The cooler will be secured shut with packing tape. Custody seals, for evidence purposes, will be taped to the cooler in at least two, locations.

- Whenever samples are split with a source or government agency, a separate chain-of-custody record will be prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency will request the representative's signature acknowledging sample receipt.

- All shipments will be accompanied by the chain-of-custody record identifying the contents.

- If the samples are sent by common carrier, a bill of lading will be used. Receipts of bills of lading will be retained as part of the permanent documentation. Commercial Carriers will not be required to sign off on the custody records as long as the custody records are sealed inside the sample cooler and the custody seals remain intact.

B.3.8 Laboratory Chain-Of-Custody Procedures

The laboratory (SWOK) custody procedures and document control will be carried out according to the SOWs or as specified in the SOPs. U.S. EPA's Region V CRL chain-of-custody procedures for CRL are described in the CRL's SOP.

B.4 ANALYTICAL METHODS REQUIREMENTS

B.4.1 Analytical Laboratory Procedures

PCBs will be analyzed using a modified SW846-8082 method under a flexibility clause to the CLP organic SOW. Dioxins will be analyzed through a U.S. EPA Region V SAS contract using method SW846-8290. TOC will be analyzed by U.S. EPA Regin V CRL following a CRL modified TOC method (see Appendix B for CRL TOC SOP). PCBS will have a reporting limit of 0.025 mg/kg. TOC will have a reporting limit of 1 percent organic carbon. Dioxin samples will have a reporting limit as specified in the U.S. EPA Region V SAS agreement with SWOK. The actual detection limits obtainable for a specific sample depend upon sample characteristics and possible matrix interference. Departures from the detection limits will be consistent with CLP or other applicable requirements including method adherence, deliverables, audit procedures, and a performance evaluation equivalent to the QA/QC procedures in CLP SOWs or method SW846. SWOK will analyze PCBs using SW846 method 8082 using full CLP QC and then preparing and submitting the equivalent of a full CLP data package.

B.5 QUALITY CONTROL REQUIREMENTS

B.5.1 Field Quality Control Checks

Field quality control checks are used to assess the representativeness of the sampling. They are designed to determine what effects activities such as sample collection, bottling, shipping, and storage have on sample integrity and to ensure that samples available for analysis in the laboratory are representative of actual conditions on Site. Field quality control checks, which will be conducted in accordance with the applicable procedures and frequencies described in this QAPP and FSP, including MS/MSDs, and field duplicates.

B.5.2 Laboratory Quality Control Checks

Internal laboratory QC procedures for the sample analyses are specified in the respective SOWs, methods and SOPs (for TOC). These specifications include the types of QC checks required (method blanks, reagent/preparation blanks, MS/MSD, calibration standards, internal standards, surrogate standards, the frequency of each audit, the specific calibration check standards, laboratory duplicate/replicate analysis), compounds and concentrations to be used, and the QC acceptance criteria for these audits.

Laboratory analysis will be conducted in accordance with the appropriate SW-846 analytical methods, or other standard quality control procedures for organic analyses. Internal laboratory quality control checks include: (1) standardization, (2) reagent or method blank generation, and (3) surrogate and matrix spike addition and analysis. TOC analysis will follow the CRL SOP for TOC.

B.6 INSTRUMENT/EQUIPMENT PREVENTIVE MAINTENANCE

B.6.1 Field Equipment/Instruments

There is no field measurement instrumentation (i.e. pH meters, etc) that will be utilized for this project. Spare parts for sampling equipment (i.e. geoprobe, coring tools, etc) will be kept onsite whenever possible.

B.6.2 Laboratory Instruments

The primary objective of a preventive maintenance program is to help ensure the timely and effective completion of a measurement effort by minimizing the downtime of crucial sampling and/or analytical equipment due to expected or unexpected component failure. In implementing this program, efforts are focused in three primary areas; maintenance responsibilities; maintenance schedules, and adequate inventory of critical spare parts and equipment. Maintenance responsibilities for laboratory equipment will be assigned to the respective laboratory managers. The laboratory managers will then establish maintenance procedures and schedules for each major equipment item. These will be contained in the maintenance logbooks assigned to each instrument Preventative maintenance is covered in the CLP SOWs, the CRL SOP for TOC, and in the SW846 methods that will be modified and used for this project. The preventative maintenance program for SWOK (PCBs and dioxin) should be contained in the contract agreements that the Sample Management Office has with SWOK (PCBs) and that U.S. EPA Region V has with SWOK (dioxins).

Along with a schedule for maintenance activities, an adequate inventory of spare parts is required to minimize equipment down time. This inventory emphasizes those parts (and supplies) which are subject to frequent failure, have limited useful lifetimes, or cannot be obtained in a timely manner should failure occur. The respective laboratory managers are responsible for maintaining an adequate inventory of spare part and backup instrumentation.

B.7 INSTRUMENT CALIBRATION AND FREQUENCY

Calibration procedures and frequency of laboratory instrumentation as specified in the U.S. EPA, or other approved methods will be strictly adhered to. Calibration of field instruments and equipment will be performed at approved intervals as specified by the manufacturer or more frequently as conditions dictate. Calibrations may also be performed at the start and completion of each test run. However, such calibrations will be reinitiated as a result of delay due to meals, work shift change, or damage incurred. Calibration standards used as reference standards will be traceable to the National Institute of Standards and Technology (NIST), when possible. All calibration activities and results will be recorded in field log books.

B.7.1 Laboratory Instruments

Records of calibration, repair, or replacement will be filed and maintained by the designated laboratory personnel performing quality control activities. These records shall be filed at the location where the work is performed and will be subject to QA audit. For all instruments, the laboratory shall maintain a factory-trained repair staff with in-house spare parts or shall maintain service contracts with vendors. To facilitate data validation on selected analytical laboratory results, the laboratories will include calibration data deliverables required by CLP SOW, SW846 8082 and 8290, and as stated in the CRL SOP for TOC in the raw data packages.

B.8 INSPECTION/ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

Guidelines for sample container procurement are detailed in Section 10 of the FSP.

B.9 DATA ACQUISITION REQUIREMENTS (NON-DIRECT MEASUREMENTS)

Historical data/background information is presented in section A.5 of the QAPP. Historical data was used to determine the parameters to analyze (PCBs) and the general locations that will be sampled. The current assessment will provide a more complete understanding of the relationship of PCBs and dioxins in the Kalamzoo River sediment/soil to promulgate the direction of future Kalamazoo River sampling and potential remediation activities. This sampling event will also refine the volume estimation of contaminated sediment to be removed from the assessment area. The sample analysis will determine the delineation and extent of contamination of sediments, exposed sediments, and floodplain soils.

B.10 DATA MANAGEMENT

B.10.1 Field Measurements and Sample Collection

Raw data from any field measurements and sample collection activities will be appropriately recorded in the field logbook. If the data are to be used in the project reports, they will be reduced or summarized, and the method of reduction will be documented in the report.

B.10.2 Laboratory Reporting and Record-Keeping

Although the proposed PCB analyses will be conducted in accordance with non-CLP SW-846 methods, the analytical laboratory will prepare and submit full analytical and QC data packages. The laboratory deliverables will include the following (as applicable):

- Narrative, including statement of samples received, description of any deviations from standard procedures, explanation of qualifications regarding data quality, and any other significant problems encountered during analysis.
- All QC data including Forms I to X; e.g., surrogate spike results for each sample, matrix spike, and matrix spike duplicate results, method blank results, and initial and continuing calibration checks.
- All inorganic QC data, including Forms I to Xm; e.g., spike and duplicate results, method blank results, and initial and continuing calibration checks).
- Field and laboratory chain-of-custody documentation pertaining to each sample delivery group analyzed.

The Laboratory Project Manager will, as part of the data validation process, confirm that documentation is complete and legible; qualitative identifications are accurate; calculations are accurate; results are expressed in the appropriate units and number of significant figures; and the required quality control checks were run and met acceptance criteria. All pages in all data packages will be consecutively numbered. Review and approval of the data will be documented by the Laboratory Project Manager.

B.10.2 Electronic Records

Analytical data results for the PCB samples will be managed using EquIS data management software by Earthsoft, Inc.. SWOK, the laboratory performing the PCB analysis, will create an electronic deliverable document (EDD) that is compatible with the EquIS software. The data points, and GPS information supplied by the FIELDS group will all be EquIS compatible.

Analytical results for the dioxin and TOC samples will not be in an electronic format. However, if required, the data can be manually added to the EQUIS database.

SECTION C
ASSESSMENT/OVERSIGHT

C.1 ASSESSMENT AND RESPONSE ACTIONS

Assessment of performance of both field and laboratory activities will be conducted to verify that sampling and analysis are performed in accordance with procedures established in the FSP and QAPP. Assessment will be performed in the form of audits. Audits of field and laboratory activities include internal and external audits.

Quality assurance system audits are conducted at least once during activities that may affect the integrity of the sampling program. The objectives of the system audits are:

- To verify that a system of quality control measures, procedures, reviews, and approvals is established for all activities that generate and process environmentally-related data.
- To verify that a system for project documentation (records, chain-of-custody forms, analytical tags, logbooks, worksheets, etc) is established.
- To verify documentation of the required quality control reviews, approvals, and activity records.
- To identify nonconformances with the established system of quality control measures, procedures, reviews, approvals, and documentation.
- To recommend corrective actions for identified nonconformance.
- To verify implementation of corrective action.
- To provide written reports of audits.

C.1.1 Field Performance Assessment

A field performance assessment (internal audit) may be performed by the START QAO or a designee. The audit will include examination of sample collection, handling and packaging procedures, chain-of-custody, etc., to ensure compliance with the established requirements. The audit will occur at the onset of the project to verify that all established procedures are followed. Follow-up audits will be conducted as deemed by the QAO and/or project manager, to correct deficiencies and to verify that QA procedures are maintained throughout the entire project. Survelliance of field sampling and testing equipment will be performed by the START project leader/field team leader.

External audits may also be conducted by the U.S. EPA Region V FSS or MDEQ. These audits may be scheduled or unannounced.

C.1.2 Laboratory Performance Audits

A laboratory system audit is a review of laboratory operations. It is conducted to verify that the laboratory has the necessary facilities, equipment, staff, and procedures in place to generate acceptable data. These audits may be performed by U.S EPA Region V.

A laboratory performance audit verifies the ability of the laboratory to correctly identify and quantify compounds in blind check samples submitted by the auditing agency. Performance audits will consist of the U.S. EPA sending performance evaluation (PE) samples to CLP laboratories for ongoing assessment of laboratory precision and accuracy. The analytical results of the analysis of PE samples will be evaluated by U.S. EPA to ensure that the laboratory maintains good performance.

External audits of laboratory activities are the responsibility of U.S. EPA Region V. The execution and frequency of these audits is at the discretion of the U.S. EPA.

C.1.3 Corrective Action

Corrective action can result from nonconformance to QAPP requirements. Corrective action may be required due to malfunctioning equipment systems and instruments, or equipment systems and instruments that fail calibration or generate data that exceed stated acceptance limits and may occur during sampling and handling, sample preparation, laboratory instrument analysis, and data review. It is the responsibility of the WESTON project manager to assure that corrective action be initiated as soon as possible.

For non-compliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the WESTON project manager, or his designee. Any nonconformance with the established quality control procedures in the QAPP or FSP will be identified and corrected in accordance with the QAPP. All changes will be evaluated based on their potential to affect the quality of the data. Information on these problems will be promptly communicated to the WESTON QAO, U.S. EPA RPM, and U.S. EPA OSC, as applicable. Implementation of corrective actions will be confirmed in writing through the same channels and documented in the site files.

Corrective actions will be implemented and documented in the field logbook. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, work may be stopped by a stop-work order issued by the U.S. EPA RPM, U.S EPA OSC, or the WESTON QAO.

For the CLP RASs, corrective action is implemented at several different levels. The laboratories participating in the CLP are required to have a written SOP specifying corrective action to be taken when an analytical error is discovered or the analytical system is determined to be out of control. The SOP requires documentation of the corrective action and notification by the analyst about the errors and corrective procedures. These above procedures also apply to the SWOK, the U.S. EPA

Region V SAS laboratory for dioxin analysis, and the U.S. EPA Region V CRL that will be analyzing for TOC.

If resampling is deemed necessary due to laboratory problems, the U.S. EPA must identify the necessary approach including cost recovery form the CLP for the additional sampling effort. The WESTON QAO must be notified in writing of all decisions.

C.2 REPORTS TO MANAGEMENT

As recommended in the Region V Model QAPP instructions, quality assurance reporting will be included as part of the project monthly status reports currently issued to U.S. EPA by the 20th day of each month. These reports will include projected delivery dates and schedule delays, results of performance or system audits, deviations from the QAPP or FSP and the associated corrective action and the usability of data. Additional quality assurance information will be included in the project final report.

SECTION D

DATA VALIDATION AND USABILITY

D.1 REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

All data generated in field and laboratory activities will be reduced, reviewed and validated prior to reporting. No data will be disseminated by the laboratory until they have been subjected to the procedures, which are summarized below.

D.1.1 Data Reduction and Review

Raw data from field measurements and sample collection activities will be appropriately recorded in the field logbook. If the data are to be used in the project reports, they will be reduced and summarized, and the method of reduction will be documented in the report.

Laboratory data reduction procedures will be in accordance with the requirements of the CRL SOP for TOC, SW846-8290 method for dioxin, and the combination of the CLP SOW for organics and SW846-8082 for PCBs. For each of the methods, the laboratory project manager will complete a thorough inspection of all reports prior to release of the data. Following review and approval of the preliminary report by the Laboratory Project Manager, final reports will be generated and signed by the Laboratory Project Manager.

D.1.2 Data Validation

U.S. EPA Region V CRL will complete the data validation for the TOC samples. The validation will be in accordance with the TOC method specified in the CRL SOP for TOC (Appendix B). U.S. EPA Region V ESAT will complete the data validation for the dioxin samples analyzed under the U.S. EPA Region V SAS Contract with SWOK. All SWOK PCB data analyzed under the flexibility clause in the CLP SOW will be validated by the WESTON Sample Management Coordinator, the QAO, or their appropriately trained designees. Upon receipt of the laboratory data package, the Sample Management Coordinator will inspect each package for completeness. Completeness is evaluated by auditing the data package for:

- Chain-of-Custody records.
- Technical holding times.
- Required analytical methods.
- Reporting limits.
- Reporting format.
- Laboratory and field QC reporting forms (blanks, calibrations, laboratory control samples, duplicates, matrix spikes, etc., as appropriate).
- Appropriate supporting data.
- Case narrative.
- Completeness of results.

Details of any missing, incomplete or incorrect parts of the data packages will be stamped "Resubmitted on [date]", attached to the original data package, and returned to the analytical laboratory. All persons receiving data packages will receive copies of the resubmitted data from the laboratory. Once it has been determined that a complete data package has been provided by the laboratory, the data package(s) will be given to the data validator.

D.2 VALIDATION AND VERIFICATION METHODS

Validation for data usability will be accomplished by comparing the contents of the data packages and QA/QC results to the requirements contained in the QAPP, the respective methods, and the

laboratory SOPs. Raw data such as GC/MS and GC chromatograms and mass spectra, data reports and data station printouts will be examined to ensure that reported results are accurate.
The guidelines for data validation are presented in:

- Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses U.S. EPA, October 1999.

As the PCB samples are being analyzed under the flexibility clause of the CLP SOW and by SW846-8082, the combination of the Organic Functional Guidelines and SW846-8082 method requirements will be used during data validation. The data validation findings and comments will be presented in narrative form and will indicate whether the data are (1) usable as quantitative concentrations, (2) usable with caution as estimated concentrations, or (3) unusable due to out-of-control QC results. The appropriate quality assurance data validation summary reports will be prepared and submitted along with sample data and summary sheets to the U.S. EPA Region V RPM after sample results are provided to U.S. EPA.

WESTON will also provide a data compliance check of the dioxin data and TOC data after receipt from the U.S. EPA.

D.3 USABILITY/RECONCILIATION WITH DATA QUALITY OBJECTIVES

There are no field measurements planned at this time. Field measurements associated with the GPS or other sampling locator device, will be the responsibility of the FIELDS group and not covered under this QAPP.

Laboratory results will be assessed for compliance with required precision, accuracy, completeness, and sensitivity requirements as described in section A.7 of this QAPP. Data which does not meet the requirements specified in section A.7 and QA requirements in the analytical methods will be discussed in the data validation summaries and incorporated into the data assessment report for this project. Any sources of sampling or analytical error will be identified as early as possible during the sample collection activities so that corrective action can quickly be implemented. Data which is not deemed usable to support or address the project decision making process will be identified and the potential need for additional sampling will be discussed with all project parties.

FIGURES

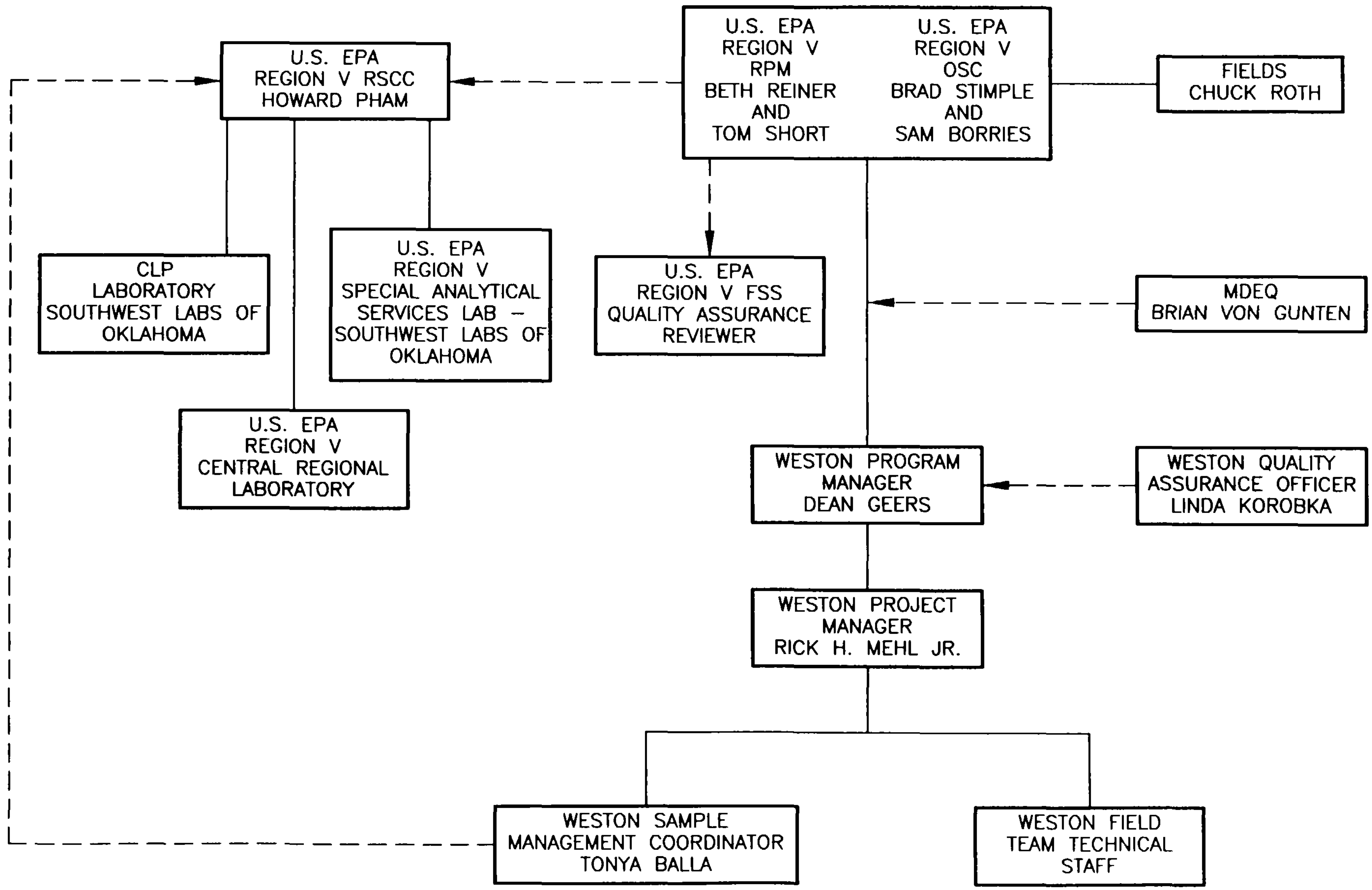
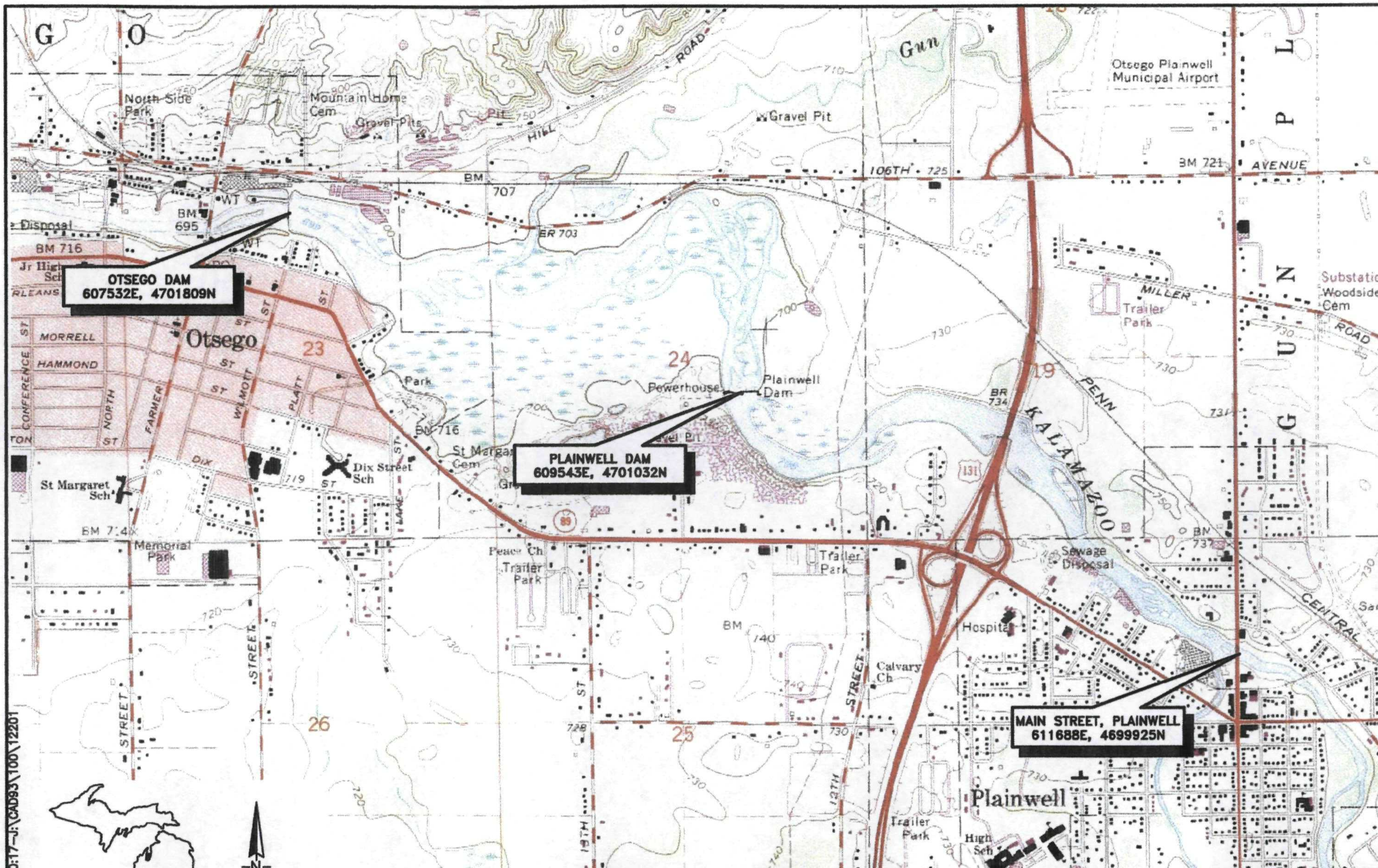
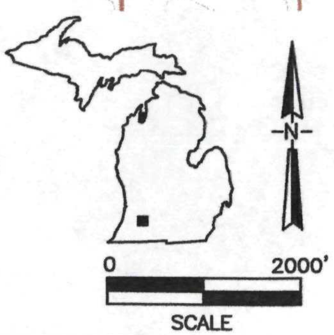


FIGURE A-1

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM
U.S. EPA CONTRACT No. 68–W–00–119
TDD No. 0103–002
DOCUMENT CONTROL No. RFW67–2E–AAGD

PROJECT ORGANIZATION CHART
ALLIED PAPER – KALAMAZOO RIVER SITE
U.S. EPA – REGION V
Otsego–Plainwell, Michigan





SOURCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAPS.
OTSEGO, MICHIGAN QUADRANGLE.

FIGURE A–2

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM	SITE LOCATION MAP
U.S. EPA CONTRACT No. 68–W–00–119 TDD No. 0103–002 DOCUMENT CONTROL No. RFW67–2E–AAGD	ALLIED PAPER – KALAMAZOO RIVER SITE U.S. EPA – REGION V Otsego–Plainwell, Michigan

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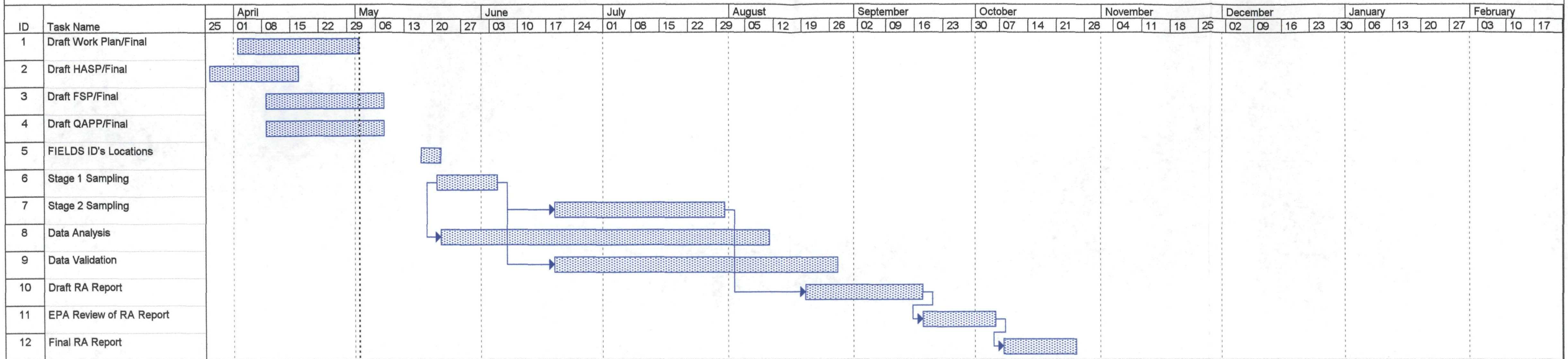
Allied Paper - Kalamazoo River Site
Project Schedule

Figure A-3



Project: AP Kalamazoo R. Project
Date: Wed 05/02/01

Task | Split | Progress | Milestone | Summary | Rolled Up Task | Rolled Up Split | Rolled Up Milestone | Rolled Up Progress | External Tasks | Project Summary

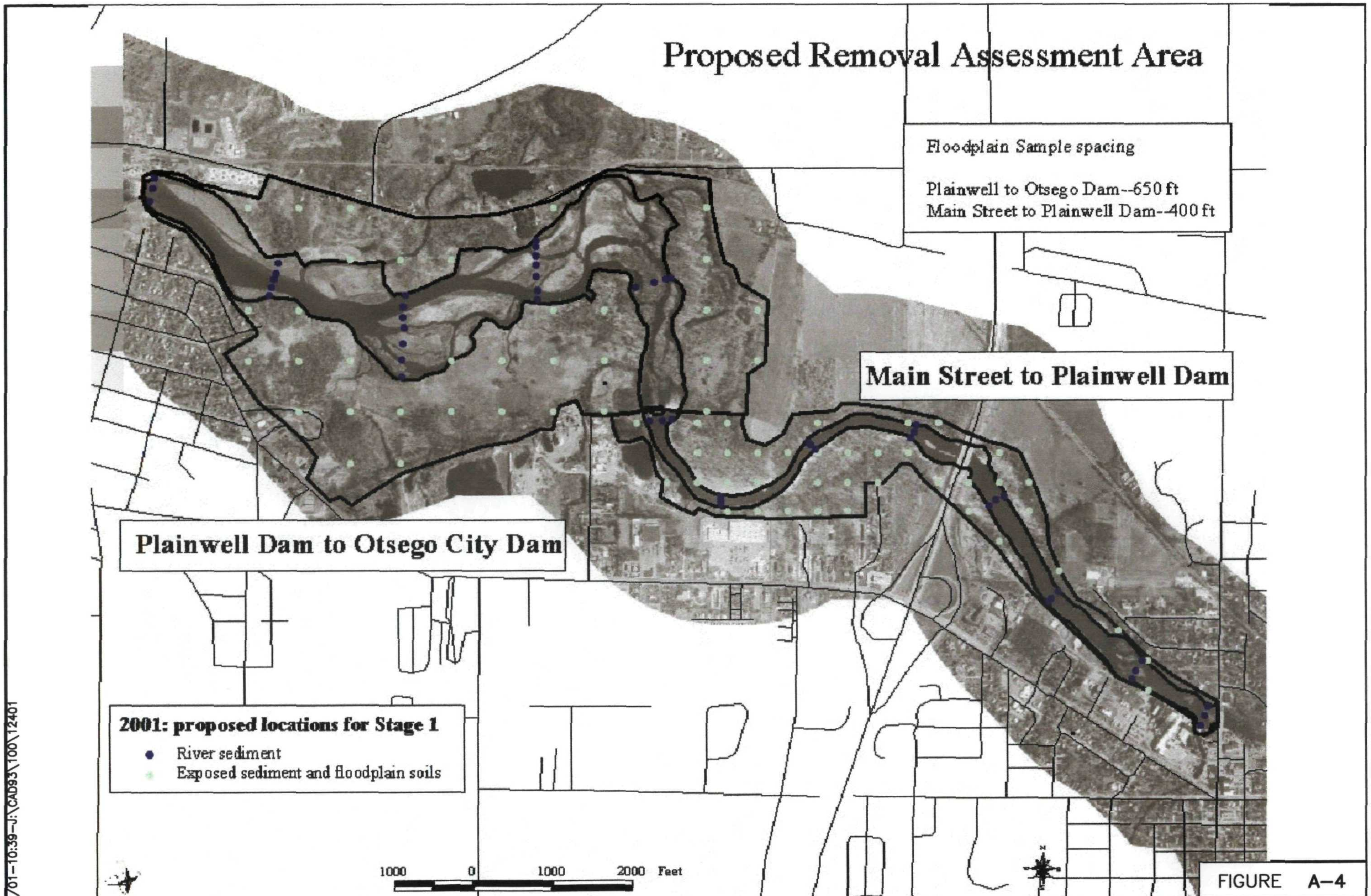


FIGURE A–4

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM
U.S. EPA CONTRACT No. 68–W–00–119
TDD No. 0103–002
DOCUMENT CONTROL No. RFW67–2E–AAGD

STAGE 1 PROPOSED SAMPLE LOCATION MAP
ALLIED PAPER – KALAMAZOO RIVER SITE
U.S. EPA – REGION V
Otsego–Plainwell, Michigan

HERNANDD–05/02/01–10:39–J:\CAD93\100\12401

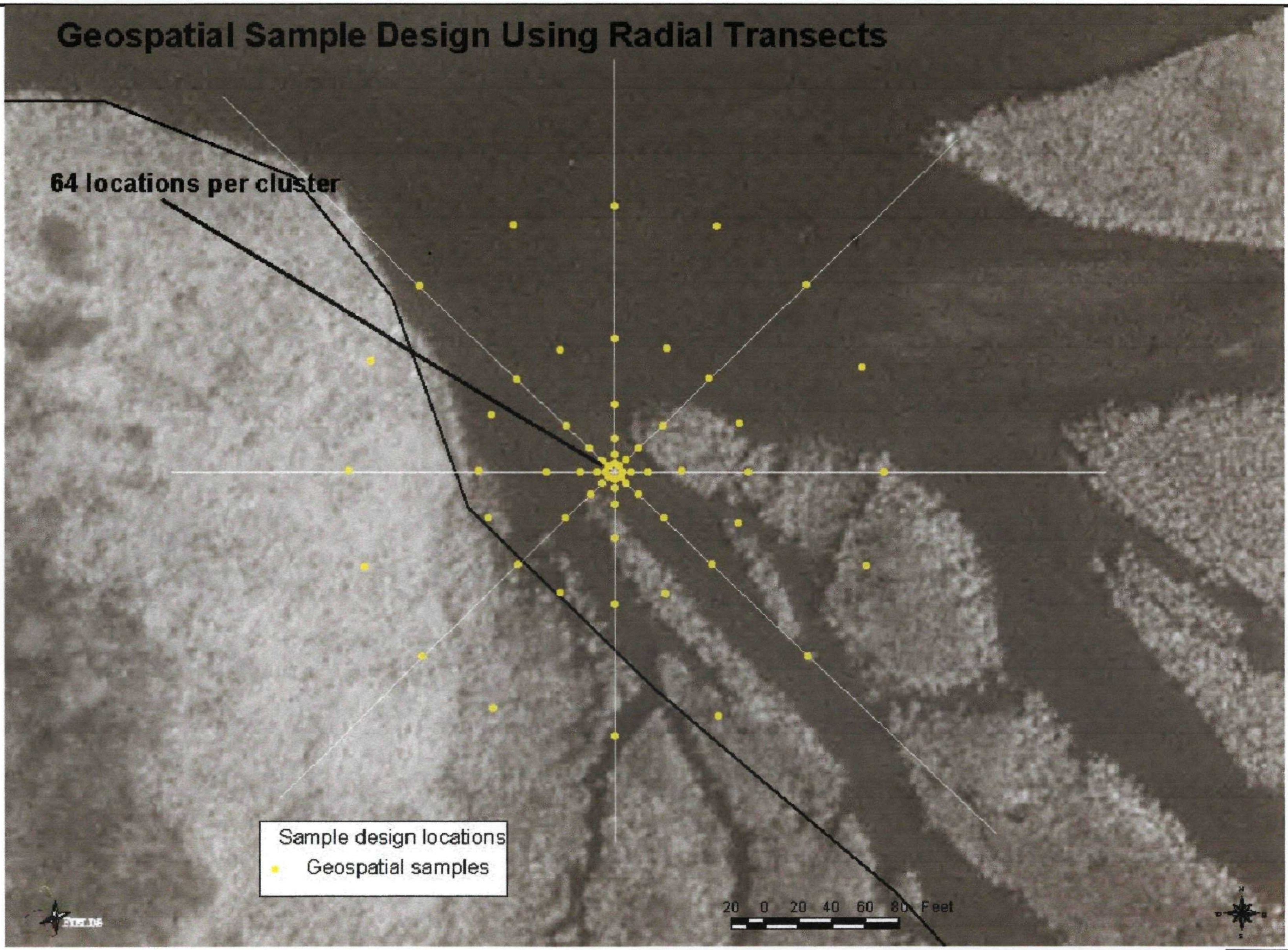


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FIGURE A-5

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM	STAGE 2 PROPOSED GEOSPATIAL SAMPLE DESIGN
U.S. EPA CONTRACT No. 68-W-00-119 TDD No. 0103-002 DOCUMENT CONTROL No. RFW67-2E-AAGD	ALLIED PAPER - KALAMAZOO RIVER SITE U.S. EPA - REGION V Otsego-Plainwell, Michigan

APPENDIX A

FIELD SAMPLING PLAN
FOR
ALLIED PAPER - KALAMAZOO RIVER SITE
OTSEGO/PLAINWELL, MICHIGAN

May 2001

This document was prepared by WESTON in accordance with the terms of the U.S. EPA Region V Contract No.68-W-00-119, and contains Confidential Business Information.

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FIELD SAMPLING PLAN
FOR
ALLIED PAPER - KALAMAZOO RIVER SITE
OTSEGO/PLAINWELL, MICHIGAN

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SECTION 1

INTRODUCTION

The removal assessment sampling event for the Allied Paper - Kalamazoo River site will provide more accurate analytical data for modeling the extent of polychlorinated biphenyl (PCB) and dioxin contamination in the Kalamazoo River. The data collected during the field investigation will be used to provide technical support for the development and evaluation of removal alternatives. The sampling event/field investigation is composed of the following activities:

- Sediment and soil investigations
  - Floodplain soil sampling
  - Instream sediment sampling
  - Exposed sediment sampling

This Field Sampling Plan (FSP) presents the details of field activities, discusses individual sampling rationale, and provides the field sampling procedures and protocols. Specifically, the FSP is organized as follows and addresses the following:

- Section 2—Sample Network Design and Rationale
- Section 3—Field Investigation Protocols
- Section 4—Field QC Samples
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SECTION 2

SAMPLE NETWORK DESIGN AND RATIONALE

The objectives of the field investigation at the Allied Paper - Kalamazoo River site fall into the following categories:

- Dynamics of PCB and River Sediment/Soil - This assessment will provide a more complete understanding of the relationship of PCBs and dioxins in the Kalamzoo River sediment/soil to promulgate the direction of future Kalamazoo River sampling and potential remediation activities.

- Provide Data for Comparison to 1994 Sampling Event - Sample collection and analysis will provide data for comparison between the 1994 sampling event and this removal assessment area.

- Delineation of Soil/Sediment Matrix - Sample analysis will determine the delineation and extent of contamination of sediments, exposed sediments, and floodplain soils.

- Removal Volume Estimation - This sampling event will refine the volume estimation of contaminated sediment.

- Provide Data for Cost Estimation - Data from analytical results will aid in the definition and evaluation of alternative remedies and provide criteria for a more refined cost analysis.

The field activities are expected to generate sufficient data to support a removal assessment. Table 2-1 and 2-2 presents a summary of the sampling and analysis program for the Allied Paper - Kalamazoo River site. The following subsections present the rationale behind each field activity planned for the field investigation.

2.1 SITE RECONNAISSANCE

2.1.1 Site Walk and Sample Location Demarcation

A site walk will be performed to ensure that the site is safe for sampling activities and fording the river. FIELDS personnel will use a Global Positioning System (GPS) unit to identify and flag sample locations for stage one sampling.

2.2 FIELD INVESTIGATION

2.2.1 Sample Location Design

Samples will be collected from two preliminary site areas that are expected to be a representative cross-section of sediment type, flow characteristics, and histories. Section one is the area of the river from Main Street in Plainwell to the Plainwell dam. The channel length is approximately 1.8 miles. Section two is the area from Plainwell dam to Otsego City dam which also has a channel length of approximately 1.8 miles. Sample locations need to contain all three substrates of concern including; in-stream sediment, exposed sediment, and floodplain soil (FIELDS, 2001).

2.2.1.1 Stage One Grid Sampling

During stage one, approximately 120 locations will be sampled, 59 in section one and 61 in section two (Figure 2-1). The number of samples will be proportional to each area sampled using a systematic grid providing locations with high concentration, low concentration, and non-detections for stage two. At each location, a sample will be collected from one of three of the target substrates: instream sediment, exposed sediment, and floodplain soil. Instream sediment samples will be collected from the following intervals; 0-6 inches (in), 6-12 in, 12-24 in, and one-foot increments thereafter until refusal. Exposed sediment and floodplain soil will be collected following intervals; 0-6 in., 6-12 in., 12-24 in., 24-36 in., 36-48 in., and 48-60 in. Samples will be collected to refusal or until native soil is visible. Samples will be placed into an 8-ounce clear wide mouth glass sample jar and a 4-ounce glass sample jar with a teflon-lined cap and cooled to four degrees Celsius (°C). The 8-ounce sample will be analyzed for PCBs (aroclors) and the 4-ounce sample for total organic carbon (TOC). Twenty samples from the section one first interval (0-6 in) sample locations will be collected for dioxin analysis. The sample will be placed in a 4-ounce wide mouth glass sample jar, cooled to 4°C, and analyzed for dioxins. Section one samples will be dispersed throughout a 300-foot grid with five transects across the river within the grid. Section two samples will be dispersed throughout a 500-foot grid also with five transects across the river.

2.2.1.2 <u>Stage Two Radial Sampling</u>

Stage two will implement a radial grid using an adaptive fill around selected "hot spots" (Figure2-2) determined from analytical results received from stage one sampling. Sampling will provide data for correlation analysis and to determine "hot spot" size. Four cluster areas will be collected, two for predominantly instream sediment and two for predominantly exposed sediment for a total of 256 sample locations. The radial clusters will likely encompass instream sediment, exposed sediment, and floodplain soil. Cores will be collected with predetermined distances of 5 feet (ft) 10 ft, 20 ft, 40 ft, 80 ft, 160 ft in each of eight directions (radially). Eight additional sample locations are located in both the 80-foot and 160-foot distances for a total of 64 locations on each cluster. At each location, a sample will be collected from one of three of the target substrates: instream sediment, exposed sediment, and floodplain soil. Instream sediment samples will be collected from the following intervals; 0-6 inches (in), 6-12 in, 12-24 in, and one-foot increments thereafter until refusal. Exposed sediment and floodplain soil will be collected following intervals; 0-6 in., 6-12 in., 12-24 in., 24-36 in., 36-48 in., and 48-60 in. Samples will be collected to refusal or until native soil is visible. Samples will be placed into an 8-ounce clear wide mouth glass sample jar with a teflon-lined cap and cooled to 4°C, and analyzed for PCBs (aroclors). FIELDS will flag or mark each location via GPS.

2.2.2 Sample Collection Procedure

Sample teams will collect instream samples in areas of the river with weak currents and shallow water (less than 3 feet deep) using waders and samples in areas with deeper water or stronger currents will require the use of a 12 -foot John-boat with a center sampling port equipped with a small motor. To obtain the instream sediment samples from the Kalamazoo River, a three-inch diameter core sampling apparatus constructed of polyvinyl chloride (PVC) with Lexan® tubing will be driven by hand until refusal. Samples will be collected from the following intervals; 0-6 inches (in), 6-12 in, 12-24 in, and one-foot increments. Disposable plastic scoops and aluminum trays will be used for homogenizing the contents of the Lexan® tubing. The disposal methods for personal protective equipment (PPE) and disposable sampling equipment generated on site will be double bagging and disposed as dry industrial waste. GPS positions (+/- 1 centimeter (cm) horizontal, +/- 2 cm vertical) will be taken for true elevation of each core (FIELDS, 2001).

An All Terrain Vehicle (ATV) or a four-wheel-drive truck, equipped with a hydraulically pressure driven soil sampler (Geoprobe®), will be implemented to obtain consistent core depths in floodplain soil, and exposed sediment to a depth of 60 inches in the following intervals: 0-6 in., 6-12 in., 12-24 in., 24-36 in., 36-48 in., and 48-60 in. Samples will be collected to refusal or until native soil is visible. The hand-powered samplers will be used when the Geoprobe truck can not access a desired sampling location, or a property owner has allowed sampling access, but does not allow the Geoprobe ATV or truck on site due to potential property damage.

The truck-mounted Geoprobe drives a 3-foot long, 4-inch diameter hollow sampling rod section into the ground by means of a motor-driven hydraulic hammer. Discrete samples are collected at desired depths. After the rod has been driven into the soil to the desired depth and the sample collected, the motor may be reversed to remove the sampling rod. The hollow rods are lined with a plastic insert to collect samples and help preserve the cleanliness of the interior of the rod. After the rod has been extracted from the ground, the plastic insert is removed and the sample is geologically logged, screened for desired parameters, and samples are collected and preserved for laboratory analysis. The plastic sheeting is discarded as investigation-derived waste (IDW), and the rods are decontaminated.

A hand-powered Geoprobe® unit or equivalent hand-powered probe will be used at locations that are inaccessible with the ATV-mounted or truck mounted Geoprobe®. The hand-powered unit consists of a 3-foot long, 2-inch diameter hollow sampling rod that is driven into the ground by means of a hand-driven lever and hammer system. Discrete samples are collected at the desired depths. After the rod has been driven into the soil to the desired depth and the sample collected, the rod is extracted by means of a built-in jack removal system. The hollow rods are lined with a plastic (Lexan®) insert to collect samples and help preserve the cleanliness of the inside of the rod. After the rod has been extracted from the ground, the plastic insert is removed and the sample is geologically logged and screened for desired parameters. The rods are decontaminated between sample locations.

A bucket auger may also be used to collect soil samples when soil conditions prevent use of the Geoprobe® sampler. The T-handled stainless-steel bucket auger is manually augered into the ground and soil enters the 2- or 4-inch diameter bucket sampler. The auger and discreet interval of soil is retrieved from the borehole in 6- inch sections. Discrete samples are collected at desired depths. The soil is geologically logged and screened for desired parameters. The auger and extension rods are decontaminated between sample locations.

FIELDS personnel will conduct a GPS survey of the boundaries of the exposed sediments and flood plain which are needed for volume determination and interpolation. A bathymetric survey, dependent upon water depth in the study area, will be conducted to give accurate elevations of cores for three-dimensional interpolations. If water levels are too shallow (under three feet) core locations will be determined using a total station GPS (1 cm accuracy) to give the necessary vertical accuracy. Sediment probes will be used to determine sediment thickness and estimate the total sediment volume. Probe locations will be predetermined based on a sampling grid and will be located in real-time using GPS (+/- 1 meter) (FIELDS, 2001).

SECTION 3

FIELD INVESTIGATION PROTOCOLS

The following sections detail the procedures that will be followed during the field investigation at the Allied Paper - Kalamazoo River site. All sample container preservation and volume requirements are outlined in Section 7.

3.1 SITE RECONNAISSANCE

3.1.1 Site Walk and Sample Location Demarcation

A site walk will be performed to ensure that the site is safe for sampling activities and fording the river. FIELDS personnel will use a GPS unit to identify and flag sample locations for stage one sampling.

3.2 SEDIMENT AND SOIL INVESTIGATIONS

3.2.1 Floodplain Soil Sampling

The number of samples and the analysis for each sample type is shown in Tables 2-1 and 2-2. An All Terrain Vehicle (ATV) or four wheel drive truck equipped with Geoprobe® will be implemented to obtain consistent core depths in floodplain soil to a depth of 60 inches in the following intervals; 0-6 in., 6-12 in., 12-24 in., 24-36 in., 36-48 in., and 48-60 in. Samples will be collected to refusal or until native soil is visible. The ATV or truck-mounted Geoprobe drives a 3-foot long, 3-inch diameter hollow sampling rod section into the ground by means of a motor-driven hydraulic hammer. Discrete samples are collected at desired depths. After the rod has been driven into the soil to the desired depth and the sample collected, the motor may be reversed to remove the sampling rod. The hollow rods are lined with a plastic insert to collect samples and help preserve the cleanliness of the interior of the rod. After the rod has been extracted from the ground, the plastic insert is removed and geologically logged. Sample cores will be obtained from the Geoprobe® liners which will be cut into the appropriate lengths for sample depth intervals. Samples will be retrieved from each liner section (or interval depth), homogenized using disposable plastic scoops in aluminum trays, and placed into appropriate sampling containers and preserved for laboratory analysis.

A hand-powered Geoprobe® unit will be used at locations that are inaccessible with the ATV-mounted or truck mounted Geoprobe®. The hand-powered Geoprobe® unit drives a 3-foot long, 2-inch diameter hollow sampling rod into the ground by means of a hand-driven lever and hammer system.. Discrete samples are collected at desired depths. After the rod has been driven into the soil to the desired depth and the sample collected, the rod is extracted by means of a built-in jack removal system. The hollow rods are lined with a plastic (Lexan®) insert to collect samples and help preserve the cleanliness of the inside of the rod. After the rod has been extracted from the ground, the Lexan insert is removed and geologically logged. Samples will be retrieved from each liner section, homogenized using disposable scoops in aluminum trays, and placed in appropriate sample containers.

A bucket auger may also be used to collect soil samples when soil conditions prevent use of the Geoprobe® sampler. The T-handled stainless-steel bucket auger is manually augered into the ground and soil enters the 2- or 4-inch diameter bucket sampler. The auger and discreet interval of soil is retrieved from the borehole in 6- inch sections. Discrete samples are collected at desired depths, homogenized using disposable scoops in aluminum trays, and placed in appropriate sample containers.

3.3.2 Instream Sediment Sampling

To obtain the instream sediment samples from the Kalamazoo River, a three-inch diameter core sampling apparatus constructed of polyvinyl chloride (PVC) pipe will be used. The sampler attaches to the three-inch diameter Lexan® core tube and a rope attached to a rubber stopper is drawn through the sample tube while the sediment core is collected. The stopper creates a vacuum and keeps the sample in the core tube. Samples will be collected in the following intervals; 0-6 in., 6-12 in., 12-24 in., and in one-foot intervals thereafter or to refusal. If necessary, sediment sampling will be performed from a boat. Sediment sampling will always be executed in sequence starting with the first sample collected at the farthest downstream location with subsequent sampling progressing upstream. This will minimize cross contamination of locations due to disturbed sediment.

The core tube is removed from the sampling apparatus and taken to shore. The tube is measured and marked in the proper increments and cut into sections using a hack saw. Samples will be retrieved from each liner section, homogenized using disposable plastic scoops in aluminum trays, and placed into appropriate sampling containers. Any water that is collected with a sediment sample will not be decanted. All reusable sampling equipment will be decontaminated between each sample in accordance with procedures outlined in Subsection 3.4.

Put H_2O + mud back [illegible] future

3.3.3 Exposed Sediment Sampling

The number of samples and the analysis (PCB and TOC) for each sample type is shown in Tables 2-1 and 2-2. The core sampler implemented for instream sampling will also be used to collect exposed sediment samples if the substrate allows the liner to be driven to the necessary sampling depths. If the core sampler proves ineffective, a hand-powered Geoprobe® may also be implemented to obtain consistent core depths in exposed sediment to a depth of 60 inches in the following intervals; 0-6 in., 6-12 in., 12-24 in., 24-36 in., 36-48 in., and 48-60 in. Samples will be collected to refusal or until native soil is visible. Sample cores will be obtained from the core tube liners which will be cut into the appropriate lengths for sample depth intervals. Samples will be retrieved from each liner section, homogenized using disposable plastic scoops in aluminum trays, and placed into appropriate sample containers.

3.4 DECONTAMINATION PROCEDURES

All sampling equipment including core samplers, Geoprobe® apparatus, and hand augers will be decontaminated before being used to collect a sample. The decontamination protocol for sampling equipment is presented in Table 3-1. Whenever possible, disposable sampling supplies will be used (i.e. plastic scoops, aluminum trays) to minimize the quantity of decontamination fluids. The management of water generated during decontamination will be in accordance with the requirements outlined in Section 9. All decontamination wastewater will be containerized.

SECTION 4

FIELD QUALITY CONTROL SAMPLES

The sampling effort at the Allied Paper - Kalamazoo River site will include the following types of field QC samples:

- Field duplicates.
- Matrix spikes/matrix spike duplicates.
- Temperature Blanks

Section A.7.3.1 of the Allied Paper - Kalamazoo River site QAPP explains the purpose behind each type of QC sample. Sample containers and handling and shipment procedures that will be used are identical to those used for the investigative samples. Each field QC sample will be documented on a chain-of-custody form. Tables 2-1 and 2-2 shows the specific level of QC effort for field activities. The following subsections detail the collection procedures for each QC sample type.

4.1 FIELD DUPLICATE SAMPLES

Field duplicate samples will be collected at selected locations during floodplain soil, instream sediment, and exposed sediment sampling at a 1-per-10 sample frequencies, using procedures identical to those used for the investigative samples. Duplicate samples will be analyzed for the same parameters as the investigative sample unless otherwise stated elsewhere in the FSP or QAPP. Duplicate samples will be collected by alternatively filling two sets of sample bottles from the same sample unit (e.g., core tube, bucket auger, etc.).

4.2 MATRIX SPIKE/MATRIX SPIKE DUPLICATE SAMPLES

Matrix spike/matrix spike duplicate samples (MS/MSDs) will be collected on a one per 20 sample (or less) basis for floodplain soil, instream sediment, and exposed sediment sampling. MS/MSD samples are investigative samples on which MS/MSD analyses are performed. Investigative soil and sediment samples assigned for MS/MSD and spike/duplicate analyses do not require the collection of extra sample volume.

Field duplicate samples will not be used as MS/MSD and spike/duplicate samples. All MS/MSD and spike/duplicate samples will be identified as such on all sample paperwork.

4.2 TEMPERATURE BLANKS

Temperature blank samples will consist of small plastic bottles filled with tap water and labeled "temperature blank". Each sample shipment cooler will contain one temperature blank placed at the bottom of the cooler to ensure samples were preserved at 4°C during shipment.

SECTION 5

SAMPLE NUMBERING SYSTEM

All samples for analysis, including QC samples, will be given a unique sample number. The sample numbers will be recorded in the field logbook, the chain-of-custody (COC), and the shipping documents. Forms II Lite (Version 5) software will be used to generate COCs and sample labels.

WESTON will assign each sample two identification numbers to the PCB and dioxin samples: a project sample number and a CLP laboratory label number. TOC samples will received a project sample number and a CRL sample number. The project sample number highlights the sample matrix and location, and will be used for documentation purposes in field logbooks, as well as for presentation of the analytical data in WESTON memoranda and reports. The CLP laboratory label number is used by the U.S. EPA to track samples as is the CRL number.

5.1 PROJECT SAMPLE NUMBERING SYSTEM

The WESTON project sample numbering system will be composed of the following components:

- Project Identifier: The first part of the project sample number will consist of a two character designation. This two character code will be used to identify the Allied Paper - Kalamazoo River site. AP corresponds to Allied Paper - Kalamazoo River site removal assessment/field investigation.

- Sample Type and Sample Location: This shall consist of the following:

  - A three-character sample type code. For the proposed field sampling, FPS will designate floodplain soil, ISD for instream sediment, and ESD for exposed sediment.

- A sample location code. The above sample type code will be combined with sample location identification (e.g, FPS02 for floodplain soil sample "FPS02", ESD02 for exposed sediment sample "FP02"). For field blanks and trip blanks, the two-character sample type code will be combined with FB for field blanks and TB for trip blanks (e.g, FPTB for a monitoring well trip blank). The sample type codes and corresponding location numbers are presented in Table 5-1.

- Sequence Identifier. This shall consist of the following:

  - A two-digit sequence number that tracks the number of samples collected from a specific location. Sequence 01 refers to the first sample interval (0-6 in.), and sequence 02 refers to the second sample interval (6-12 in.). Sample depths will not be a part of the sample code; rather, depth information will be recorded in the site field logbook and presented with the analytical results.

  - If the sample is a field duplicate sample, the above will be combined with DP. If the sample is a matrix spike/matrix spike duplicate sample, the above will be combined with MSD.

It should be noted that field duplicate samples will be submitted without reference to the laboratory (i.e., the laboratory will not be informed that the sample is duplicate).

Some examples of the WESTON project sample numbering system are as follows:

- AP-FPS02-01DP: Allied Paper - Kalamazoo River site, floodplain soil location 2; duplicate of first sample interval collected at this location (0-6 in.).

- AP-ISD03-01: Allied Paper - Kalamazoo River site, instream sediment location 3; first interval at this location (0-6 in.).

- AP-ESD01-03: Allied Paper - Kalamazoo River site, exposed sediment location, third interval at this location (12-24 in.).

- AP-ESD01-03MSD: Allied Paper - Kalamazoo River site, exposed sediment location sample third interval is a matrix spike/matrix spike duplicate sample.

5.2 CONTRACT LABORATORY PROGRAM SAMPLE SYSTEM

The CLP sample numbers are unique numbers generated by the CLP that are assigned to each RAS organic sample. The Region V RSCC will provide sample numbers to the WESTON SMC as needed, who in turn will give the numbers to the Field team leader prior to the commencement of field work. The FTL, or their designee, will assign the unique CLP sample numbers to each PCB and dioxin sample.

The CLP sample numbers enable the SMO to track CLP samples through their system. The numbers are placed on the outside of the sample containers, and the number is used on all documentation (e.g., traffic report, chain-of-custody form, sample tags). The CLP sample numbers will be correlated to the WESTON project sample number thereby identifying where the sample was collected. Organic aliquots of CLP samples will have a CLP sample number that begins with the fifth letter of the alphabet (E for Region V) followed by other letters and numbers (e.g., EG 006, EJK 17).

U.S. EPA Region V CRL will assign a CRL number in lieu of the CLP sample number. The CRL number contains the following elements:

- 2001 - Indicates the fiscal year (1 October 2000 through 30 September 2001)
- ZG - Indicates contractor code (WESTON)
- 07 - Indicates WESTON sampling event for the year (01, 02-99)
- S - Indicates sample type (S= sample, D = duplicate, R = blank)
- 01 - Indicates sample number (01, 02-99)

An example CRL sample number is as follows: 2001ZG07S05 - the fifth sample collected by WESTON during this sampling (7) event.

SECTION 6
SAMPLE DOCUMENTATION AND TRACKING

6.1 FIELD RECORDS

Field observations and other information pertinent to the collection of samples will be recorded in the field. All entries will be made in a bound logbook in ink. Logbooks will be identified by unique sequential numbers. The data to be recorded for each sample will include date, time (24-hour military time reference), sample number, sample location, sample appearance, and name of the persons collecting the sample. In addition, general information will be recorded in the logbook daily, including personnel present at the site, level of protection being worn, and weather. Photographs will also be taken and logged to document sampling activities.

6.2 FIELD CHAIN-OF-CUSTODY PROCEDURES

Field chain-of-custody (COC) procedures are presented in Subsection B.3 of the QAPP. Details on the completion of field sample COC documentation are discussed in Subsection 6.3 of the FSP. Forms II Lite Version 5.0 software will be used to generate COC sheets and sample labels.

6.3 SAMPLE DOCUMENTATION FORMS

Required paperwork for CLP chemical laboratory samples includes COCs, sample tags and COC seals. All sample documentation forms will be completed by WESTON personnel in accordance with the requirements outlined in the *U.S. EPA Region V Sample Handling Manual* (U.S. EPA Region V, March 1989) or the most recent revision. The U.S. EPA is currently using the Forms II Lite Software (Version 5.0). The U.S. EPA Region V RSCC is responsible for providing WESTON with updates on changes in the sample documentation forms and requirements. The WESTON Sample Management Coordinator (SMC) will train all field personnel on any new documentation requirements before field activities begin.

The critical aspects of the documentation protocol for shipping samples to the CLP laboratories are summarized below.

Chain-of-Custody Form

Forms II Lite Software will be used to generate the COC forms. To maintain sample custody in accordance with the U.S. EPA requirements, the following sample documentation protocol must be implemented:

- Each sample shipment container must have at least one COC form enclosed if samples are being sent to the CLP laboratories.

- Each sample in a shipment container must be identified and documented on the accompanying COC form.

- The COC seal numbers on seals assigned to a particular cooler must be documented on the COCR forms in that cooler in the section provided.

- The carrier service person does not have to sign the COC form if the custody seals remain intact. The airbill number must be recorded on the COC form in the section provided.

- The site name will be printed on only certain copies of the COC form since this document does not allow this information to show up on the copies sent to the CLP laboratories.

Chain-of-Custody Seals

- Two seals per shipping container are used to secure the lid and provide evidence that samples have not been tampered with.
- The COC seals must be covered with clean tape to avoid accidental damage during shipment.
- The COC seal numbers must be documented on the COC form or stand-alone COC forms as herein described.
- All sample shipment containers require COC seals.

Sample Tags

- Each sample container must have a Sample Tag affixed to it with string or wire. Sample tags will be provided by the U.S. EPA Region V RSCC.
- COC form or stand-alone COC form numbers are recorded in the "Remarks" section of the tag.
- Sample Tag numbers are recorded on the stand-alone COC form or on the COC form.
- Sample labels will be printed using the Forms II lite software. One label will be affixed to the sample container and one to the sample tag.

All paperwork accompanying the samples being shipped to the laboratories will be sealed in a plastic bag that is taped to the inside of the cooler lid. Copies will be made of all sample documentation and retained for in-house files.

SECTION 7
SAMPLE HANDLING

7.1 SAMPLE CONTAINERS AND SAMPLE PRESERVATION

All samples collected for analysis will be containerized, preserved, packaged and shipped in accordance with *U.S. EPA Region V CRL Sample Handling Manual*, (U.S. EPA, 1989), *U.S. EPA and User's Guide to the Contract Laboratory Program* (U.S. EPA, 1988). The U.S. Department of Transportation's regulations (49 CFR 173 to 177), and *Dangerous Goods Regulations*, (International Air Transport Association (IATA), (2001). Table 7-1 lists the required sample containers, sample volumes, sample preservation requirements, and holding times associated with all parameters and media applicable to the Allied Paper - Kalamazoo River site removal assessment. WESTON will obtain sample containers according to U.S. EPA specifications as described in Section 10.

7.2 SAMPLE PACKAGING AND SHIPMENT

All samples shipped from the Allied Paper - Kalamazoo River site must be shipped in accordance with U.S. Department of Transportation regulations and must comply with *Dangerous Goods Regulations* (IATA, 2001) if shipped by air transportation.

Following sampling, the exterior of all sample bottles will be initially decontaminated near the sampling location by wiping with a moist cloth. The filled sample containers will not be sprayed with water during decontamination because this water could contact the sample if the container was not tightly sealed. In preparation for shipment to the laboratories, all samples will be packaged in accordance with the following general procedures:

- Make sure the sample labels and sample tags are securely attached to the sample containers for CLP PCB, CRL TOC, and SAS dioxin analytes. Place each container in a zip-lock baggie, ensuring that the sample tags can be read.

- Low concentration samples will be placed in a shipment container lined with a large polyethylene bag. Enough vermiculite or equivalent absorbent material will be packed around the samples to minimize the possibility of sample container breakage. The temperature will be maintained at 4° C with ice sealed in plastic bags as appropriate to the sample. The remaining space in the container will be filled with additional packing material and the large bag sealed.

- If a sample is deemed medium concentration or a dangerous good, it will be packaged in accordance with the IATA *Dangerous Goods Regulations*, based on the classification of the samples.

- Place COC forms in a zip-lock bag and tape to inside of shipment container lid.

- Close shipment container and seal it shut with strapping tape. If shipment container has a drain port, seal it shut with tape. Place custody seals across seam between the container lid and base so that custody seal would be broken if shipment container was opened. Cover custody seals with waterproof tape.

- Affix airbill with shipper's and recipient's names and addresses to top of shipment container. Affix a second mailing label with the same information to the top of container in case airbill becomes detached from container during shipment. Place "This End Up" labels on container as specified by IATA.

The WESTON FTL must contact the WESTON SMC to confirm sample shipment dates for all analyses. The FTL will notify the SMC of any last-minute changes in sampling schedule that will affect the sample shipment schedule.

SECTION 8

SAMPLING TEAM ORGANIZATION

The sampling team organization is discussed in Subsection A.4 of the QAPP.

SECTION 9

MANAGEMENT OF INVESTIGATION-DERIVED WASTES

For purposes of this FSP, investigative-derived wastes (IDW) are defined as any by-product of the field activities that is suspected or known to be contaminated with hazardous substances. The performance of field activities will produce waste products such as decontamination wastewater and expendable personnel protective equipment.

In order to collect the decontamination wastewater, DOT-approved drums will be set up in a central area where sampling teams can empty 5-gallon buckets from decontamination procedures performed during sampling activities.

Each type of waste will be segregated during the field activity and containerized separately. All storage containers will be labeled appropriately. Wastes will be stored at the site in a secured staging area until the analytical results of the site investigation are interpreted. At that time, each segregated waste will be evaluated based on the field data and disposal arrangements executed in accordance with appropriate local, state, or federal regulations. If deemed appropriate, the management of the wastes will be incorporated into the remedial action for the site. WESTON will refer to the U.S. EPA's *Management of Investigation-Derived Wastes During Site Inspections* (U.S. EPA, 1991) for guidance on off-site disposal policy, if this action is deemed necessary.

SECTION 10

SAMPLE CONTAINER PROCUREMENT

All sample containers being used for PCB, TOC, and dioxin analysis to be used during the Allied Paper - Kalamazoo River site sampling program will be purchased by WESTON from a reputable supplier capable of providing the bottle quantity and type that meet or exceed the strict quality control requirements set forth by the U.S. EPA in OSWER Directive No. 9240.0-05A.

All sample containers (bottles) will be prepared according to the procedures specified in U.S. EPA's *Specifications and Guidance for Obtaining Contaminant-Free Sample Containers*, (U.S. EPA, 1992) or the most current revision. It will be ensured that the bottles used for the sampling activity do not contain target organic contaminants exceeding the level specified in the above-mentioned document. Specifications for the bottles will be verified by checking the supplier's certified statement and analytical results for each bottle lot, and will be documented on a continuing basis. The field team leader or the leader's designee will record the bottle lot numbers associated with each sample collected during the Allied Paper - Kalamazoo River sampling effort. This data will be maintained in the project evidence file and will be available, if requested, for U.S. EPA review.

For the Allied Paper - Kalamazoo River site, the corrective actions will be conducted comprehensively to avoid the use of identified contaminated lots from other projects, and to ensure that if the bottle suppliers are deemed unresponsive or unable to provide cleaned bottles as specified, then other U.S. EPA-related projects are not negatively affected by the use of the noncompliant bottles.

If resampling is deemed necessary, WESTON will require authorization for additional effort. Any schedule delays will be brought to the attention of the U.S. EPA OSCs or RPMs.

TABLES

Table 2-1 Stage One

Summary of Sampling and Analysis Program for Allied Paper - Kalamazoo River Site
Otsego/Plainwell, Michigan

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative			Field Duplicate			Field Blank			MS/MSD[1]			Matrix Total*
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Floodplain Soils	Visual Descriptions	CLP PCBs (aroclor).	144	1	144	15	1	15	-	-	-	8	1	8	159
		CLP Dioxins	6	1	6	1	1	1	-	-	-	1	1	1	7
		CRL TOC	144	1	144	15	1	15	-	-	-	8	1	8	159
Instream Sediment	Visual Descriptions	CLP PCBs (aroclors)	196	1	196	20	1	20	-	-	-	11	1	11	216
		CLP Dioxins	8	1	8	1	-	1	-	-	-	1	1	1	9
		CRL TOC	196	1	196	20	1	20	-	-	-	11	1	11	216
Exposed Sediment	Visual Descriptions	CLP PCBs (aroclors)	140	1	140	14	1	14	-	-	-	8	1	8	154
		CLP Dioxins	6	1	6	-	-	-	-	-	-	-	-	-	6
		CRL TOC	140	1	140	14	1	14	-	-	-	8	1	8	154

[1]MS/MSDs are not additional samples, but are instead investigative samples on which MS/MSD analyses are performed
*The matrix total does not include MS/MSDs and duplicate/spike samples
**This table accounts for a total of approximately 480 samples collected at 120 locations with four depth intervals. It is estimated that samples will be relatively evenly divided between floodplain soils, instream sediment, and exposed sediment

Table 2-2 Stage Two

Summary of Sampling and Analysis Program for Allied Paper - Kalamazoo River Site
Otsego/Plainwell, Michigan

Sample Matrix	Field Parameters	Laboratory Parameters	Investigative			Field Duplicate			Field Blank			MS/MSD[1]			Matrix Total*
			No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	No.	Freq.	Total	
Floodplain Soils	Visual Descriptions	CLP PCBs (aroclors)	340	1	340	34	1	34	-	-	-	19	1	19	374
Instream Sediment	Visual Descriptions	CLP PCBs (aroclors, congeners)	344	1	344	35	1	35	-	-	-	19	1	19	379
Exposed Sediment	Visual Descriptions	CLP PCBs (aroclors, congeners)	340	1	340	34	1	34	-	-	-	19	1	19	374

[1]MS/MSDs are not additional samples, but are instead investigative samples on which MS/MSD analyses are performed
*The matrix total does not include MSMDs and duplicate/spike samples.
**This table accounts for a total of approximately 1,024 samples collected at 256 locations with four depth intervals.

Table 3-1

Standard Decontamination Protocol for Sampling Equipment
Allied River - Kalamazoo River Site
Kalamazoo and Allegan Counties, Michigan

Step	Procedure
1	Scrub equipment thoroughly with soft-bristle brushes in a phosphate-free, low-sudsing detergent solution.
2	Rinse equipment with tap water by submerging and/or spraying. (See note below.)
3	Rinse equipment with isopropanol solution.
4	Rinse equipment with hexane solution.
5	Rinse equipment with reagent-grade distilled/deionized water until dripping and allow to air dry for 1 to 2 minutes.
6	Place equipment on polypropylene or aluminum foil and allow to air-dry for 5 to 10 minutes.
7	Wrap equipment in polypropylene or aluminum foil for handling and/or storage until next use.

Note: The decontamination liquids will be managed as described in Section 9.

Table 5-1

Sample Codes and Location Numbers
Allied Paper - Kalamazoo River Site
Otsego/Plainwell, Michigan

Sample Type	Sample Type Code	Sample Location Code
Floodplain Soil	FPS	01 through *
Instream Sediment	ISD	01 through *
Exposed Sediment	ESD	01 through *

* Final count depends on the number of samples collected.

Table 7-1

Sample Container, Volume, and Preservation Requirements
Allied Paper - Kalamazoo River Site
Otsego/Plainwell Michigan

Matrix Type	Analysis	Sample Concentration Level	No. of Bottles	Type of Bottles	Preservatives	Technical Holding Time*
Soil/Sediment	PCBs (aroclors)	Low	1	8-oz clear wide-mouth glass jar	Cool, $4 \pm 2^\circ C$	14 days until extraction. Analysis within 40 days.
Soil/Sediment	TOC	Low	1	4-oz wide-mouth glass jar with teflon-lined cap	Cool, $4 \pm 2^\circ C$	28 days.
Soil/Sediment	Dioxins	Low	1	4-oz amber wide-mouth glass jar	Cool, $4 \pm 2^\circ C$	30 days until extraction. Analysis within 45 days.

* All holding times are from the date of sample collection

Note: No additional soil volume is required for laboratory analysis of MS/MSD (PCBs, TOC, and dioxin). Sample duplicates will be collected in an additional sample jar.

FIGURES

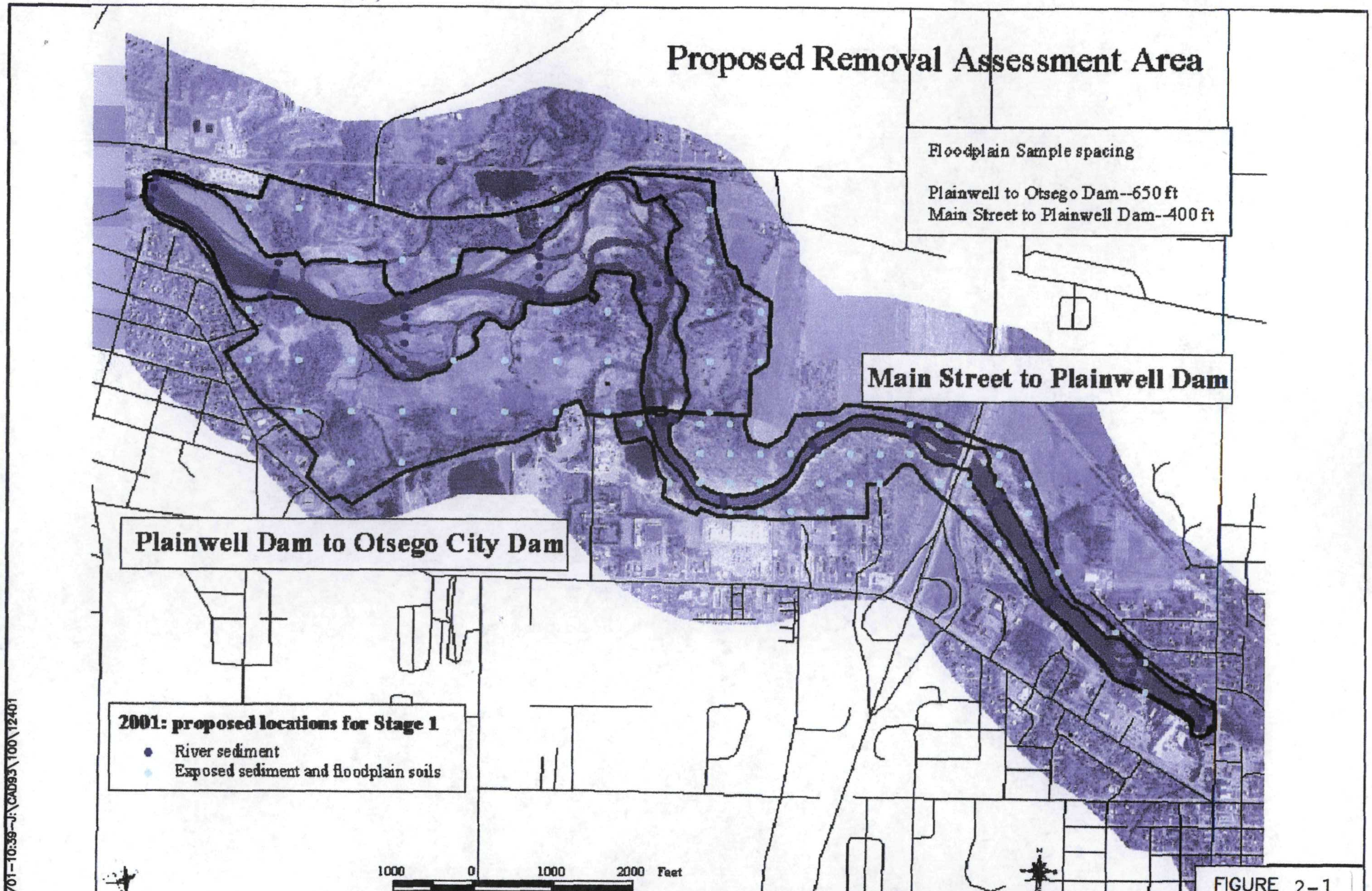

FIGURE 2-1

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM
U.S. EPA CONTRACT No. 68-W-00-119
TDD No. 0103-002
DOCUMENT CONTROL No. RFW67-2E-AAGD

STAGE 1 PROPOSED SAMPLE LOCATION MAP
ALLIED PAPER - KALAMAZOO RIVER SITE
U.S. EPA - REGION V
Otsego-Plainwell, Michigan

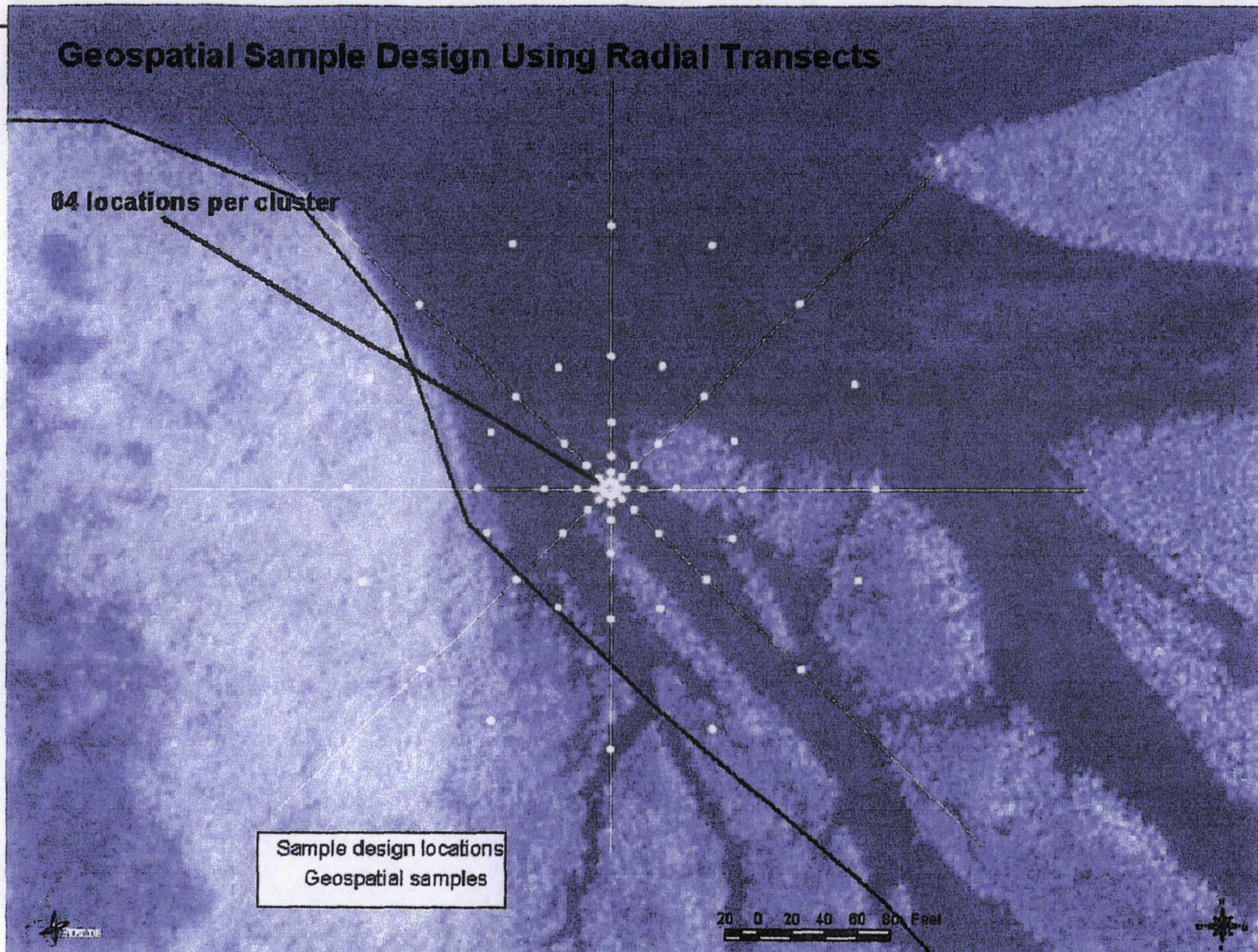

FIGURE 2-2

WESTON MANAGERS DESIGNERS/CONSULTANTS

750 E. Bunker Ct.
Suite 500
Vernon Hills, Illinois
60061

STAGE 2 PROPOSED GEOSPATIAL SAMPLE DESIGN
ALLIED PAPER – KALAMAZOO RIVER SITE
U.S. EPA – REGION V
Otsego–Plainwell, Michigan

HERNANDD–04/18/01–13:42–J:\CAD93\100\12301

APPENDIX B

STANDARD OPERATING PROCEDURES FOR DETERMINATION OF TOTAL ORGANIC CARBON (TOC) IN SOILS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5 CENTRAL REGIONAL LABORATORY
536 SOUTH CLARK STREET (ML-10C)
CHICAGO, ILLINOIS 60605

CONCURRENCE

PRIMARY ANALYST: Edgar Santiago TITLE: *Chemist* Date: 1 / 24 / 2000

GROUP LEADER: Francis Awanya TITLE: *Chemist* Date: 1 / 24/2000

CRL QA COORDINATOR: George Schupp Date: 1 / 24 /2000

CRL DEPUTY DIRECTOR: Dennis Wesolowski Date: 1 / 25 /2000

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1. **SCOPE AND APPLICATION:**

1.1 This method covers the determination of Total Organic Carbon (TOC) in soils and sediments.

1.2 Samples containing up to 62% carbon can be analyzed by this method. This range can be extended to 99% carbon using appropriate standards.

2. **SUMMARY OF METHOD:**

2.1 Total carbon in soil is determined by dry combustion with a non-dispersive, infrared carbon analyzer. Soils that contain inorganic carbon (calcareous soils) are first treated with phosphoric acid to destroy the inorganic carbon and then analyzed for total carbon.

3. **INTERFERENCES:**

3.1 Some forms of inorganic carbon (i.e. Dolomite) may be difficult to remove from the soil by acid treatment. Incomplete removal of inorganic carbon will lead to TOC results that are affected by high bias. Care must be taken to ensure that adequate time is given to the treatment process to facilitate complete removal of inorganic carbon, especially for those soils suspected of having a high inorganic carbon content.

4. **SAMPLE HANDLING AND PRESERVATION:**

4.1 Samples should only be collected in glass bottles with teflon lined caps. Storage is at 4° C. All bottles must be thoroughly rinsed with reagent water. Amount of sample collected should be sufficient to insure a representative sample, allow for replicate analysis and minimize waste disposal. Maximum holding time is 28 days.

5. **SAFETY AND WASTE HANDLING:**

5.1 Safe laboratory procedures should be followed at all times.

5.2 All reagent preparation must be performed under a fume hood.

5.3 A current awareness of OSHA regulations regarding the safe handling of the chemicals specified in this SOP is recommended. A reference file of Material Safety Data sheets (MSDS) must be maintained by the Health and Safety Officer and must be made available to all personnel involved in the chemical treatment and/or analysis.

5.4 All waste should be handled according to the laboratory waste disposal facility plan.

6. EQUIPMENT AND SUPPLIES:

6.1 LECO SC 444 non-dispersive, infrared carbon/sulfur analyzer

6.1.1 Balance - interfaced with system software (LECO part # 751-300) or equivalent. Capability $\pm$ 1 mg.

6.1.2 Autoloader kit (LECO part # 606-250-110).

6.1.3 Combustion boats (LECO part # 529-203-150).

6.1.4 Printer: Okidata Microline 320 (LECO part # 601-480) or equivalent.

6.2 Glassware and Accessories.

6.2.1 Volumetric flasks and stoppers.

6.2.2 Large culture tubes: 25x200 mm with Teflon lined screw caps (Corning part # 9826-25X) or equivalent.

6.2.3 Teflon reagent bottles and teflon lined caps.

6.2.4 Glass graduated pipets: 10 mL

6.2.5 Large and small porcelain crucibles.

6.2.6 Small Teflon stir bars.

6.2.7 Glass watch glasses.

6.2.8 Glass or metal sample/reagent scoops.

6.2.9 Mortar and pestle or automatic grinder.

6.2.10 Sieve: 100 or 140 mesh.

6.3 Analytical Balance - Accuracy 0.1 mg.

6.4 Evacuated desiccator with silica gel as desiccant.

6.5 Multi-place Stir/Hot Plate.

6.6 Oven: 60° C, 105° C .

7. REAGENTS AND STANDARDS:

7.1 PREPARATION OF REAGENTS:

Use de-ionized water for all solutions (Conductivity $\leq 1.0\ \mu S$).

All reagents should be stored in glass or Teflon reagent bottles.

Reagent 1. 4N Hydrochloric Acid (HCl)

By Volume: To a 1 L volumetric flask, add approximately 500 mL DI water. To the DI water slowly add 335 mL Concentrated HCl. **Caution: Fumes!** Dilute to mark, stopper and mix by inversion.

Reagent 2. 5% Phosphoric Acid (H_3PO_4)

By Volume: To a 1 L volumetric flask, add 800 mL DI water. To the DI water slowly add 50 mL concentrated H_3PO_4. Dilute to the mark, stopper and mix by inversion.

7.2 PREPARATION OF STANDARDS

All standards (calibration and quality control) are purchased either directly from LECO or from a manufacturer of certified standards.

List of Standards

Standard 1. Calibration Standard. KHP (47% Organic Carbon).

Standard 2. **Calibration Control Standards (ICV and CCV).** KHP (second source).

Standard 3. **Sensitivity Check Standard (SCS).** Certified soil standard.

Standard 4. **Laboratory Control Standard (LCS).** Certified soil standard (second source).

Standard 5. **Soil Standard Reference Material (SRM).**

8. QUALITY CONTROL:

Users of this method are required to operate a formal quality control (QC) program. The minimum requirements of this QC program consist of an initial demonstration of laboratory capability of performing the soil TOC method and the periodic analysis of laboratory blanks and other laboratory solutions as continuing checks on performance. The laboratory will maintain performance records that define the quality of the data generated.

8.1 ASSESSING LABORATORY PERFORMANCE

8.1.1 The standard calibration consists of a blank intercept and certified source of KHP weighed out three times at four different weights. Acceptability of the calibration depends on the recoveries obtained from the calibration verification standards (described below). Calibration of the instrument is described in section 9.3.

8.1.2 An initial calibration verification (ICV), a second source of KHP, is analyzed immediately after calibration. The result must be $\pm$ 10% of the true value. If the result is greater than $\pm$ 10% of the true value, corrective action must be taken or the instrument must be recalibrated.

8.1.3 A continuing calibration verification (CCV), a standard source of KHP (can be the same source as the one used to calibrate the instrument), is analyzed after every ten analyses, immediately after the ICV and at the end of the analytical run. The result must be $\pm$ 10% of the true value. If the result is greater than $\pm$ 10% of the true value, corrective action must be taken or the instrument must be recalibrated.

8.1.4 An instrument sensitivity check standard is analyzed immediately after the first CCV. The result must be $\pm$ 10% of the true value. If the result is greater than $\pm$ 10% of the true value, the laboratory supervisor is to be notified and corrective action taken before continuing the analysis.

8.1.5 At least one laboratory blank (LB) is analyzed with each batch of samples. The LB must be analyzed before the samples but following the ICV and the first CCV. Data produced are used to assess potential contamination from the laboratory environment.

The result must be within ± MDL. If the result is greater than ± MDL, the laboratory supervisor is to be notified and corrective action taken before continuing the analysis.

8.1.6 A laboratory control sample (LCS) is analyzed after the LB. The LCS must be pre-treated with 5% H_3PO_4 (see section 9.1.4). The result must be ± 20% of the true value. If the result is greater than ± 20% of the true value, the laboratory supervisor is to be notified and corrective action taken before continuing the analysis.

8.1.7 A laboratory duplicate is analyzed at a frequency of 1 per 5 samples. The duplicate must agree with the sample with a 20% relative percent difference or within the MDL, whichever is greater. If the RPD is greater than 20%, the laboratory supervisor is to be notified and corrective action taken.

8.2 ASSESSING ANALYTE RECOVERY AND DATA QUALITY

8.2.1 A matrix spike is performed on one sample per batch of 20 samples or less. Approximately 0.200 g of a sample is spiked with approximately 0.200 g soil standard reference material (SRM) or soil laboratory control standard (LCS). The spike recovery must be ± 20% of the calculated value of the spiked sample (see section 10.3). If the result is greater than ± 20% of the calculated value, the laboratory supervisor is to be notified and corrective action taken.

8.2.2 A matrix duplicate is performed on one sample per batch of 10 samples or less. The duplicate must agree with the sample with a 20% relative percent difference or within the MDL, whichever is greater. If the RPD is greater than 20%, the laboratory supervisor is to be notified and corrective action taken.

9. <u>PROCEDURE</u>:

9.1 ***Sample pretreatment:***

9.1.1 All samples will be pretreated for inorganic carbon.

9.1.2 A Soil TOC Pretreatment Log (Appendix 1) must be completed for all samples and standards in a sample set regardless of whether pretreatment is necessary or not. The log will be a 3 ring binder that can be located at the instrument.

Note: All samples and the LCS will be pretreated. The Soil TOC Pretreatment Log should be used to log in all samples because % solids data that may be needed during analysis can be found on this log.

Note: Only glass or metal is allowed to contact the sample. Reagent used during sample pretreatment must only contact glass or metal.

9.1.3 ***Percent Solids determination:***

9.1.3.1 If results are to be reported on a dry weight basis, percent solids will have to be determined. Please refer to the CRLSOP AIG019.

9.1.3.2 Record % solids on the Soil TOC Pretreatment Log.

9.1.4 ***Sieving and grinding samples:***

9.1.4.1 Place the sample (approximately 10 to 15 grams) in a small crucible. Cover.

9.1.4.2 Place the crucible in an oven at 60° C overnight. Some samples may take longer to dry. The sample should appear completely dry.

9.1.4.3 Allow the sample to cool. Place the entire sample in either an automatic grinder for homogenization or homogenize manually with mortar and pestle.

9.1.4.4 Once homogenization is complete, sieve the ground sample through a 100 or 140 mesh sieve. The portion of the sample which passes through the sieve is the portion which will be treated. Try to sieve as much of the ground sample through the sieve as possible.

9.1.4.5 Transfer the sieved sample to the 25x200 mm culture tubes and screw the cap on tightly.

9.1.5 ***Inorganic Carbon Test:***

9.1.5.1 Prepare 4N HCl as in section 7.1 above.

9.1.5.2 Place a small aliquot (approximately 0.5 to 1 gram) of sample on a watch glass.

9.1.5.3 To this aliquot add 1 to 2 drops of 4N HCl and observe for effervescence. Record observation on the pretreatment log.

9.1.5.4 If effervescence is detected, or the sample is suspected of having inorganic carbon present, the sample must be treated with 5% H_3PO_4 before analysis.

9.1.5.5 If effervescence is not detected in any samples proceed to section 9.2.

9.1.6 ***Treatment with Phosphoric acid (5% H_3PO_4):***

9.1.6.1 Prepare 5% H_3PO_4 as in section 7.1.

9.1.6.2 Weigh a large crucible. Record the weight.

9.1.6.3 Add the sample to crucible. Record the weight of the sample and crucible. If the sample is a spike, two weights should be entered on the Soil TOC Pretreatment Log under the Initial Weight of Crucible and Soil: 1) the weight of the sample (approximately 0.200 g) and crucible and 2) the weight of the spike added (approximately 0.200 g), the crucible and the soil.

9.1.6.4 Weigh all the samples for pretreatment in this manner.

9.1.6.5 Add 1 mL of 5% H_3PO_4 to the sample in the crucible. Observe for effervescence.

9.1.6.6 Place the crucible on stir/hot plate with a Teflon stir bar and begin wetting the soil slowly on low heat setting with mixing.

9.1.6.7 Once the entire soil is wet take the crucible from the stir/hot plate and add 1 mL of 5% H_3PO_4. Observe for effervescence.

9.1.6.8 Continue as in section 9.1.6.7 until effervescence is no longer evident. Record the amount of acid added.

9.1.6.9 To the slurry in the crucible add four times the amount of DI water relative to the amount of acid added (i.e. if 3 mL of acid was added, then add 12 mL of DI water).

9.1.6.10 Place the crucible back on the stir/hot plate and mix completely on low heat setting for 1 to 2 minutes. After mixing is complete, place the crucible on an oven safe pan and place in the oven at 105° C overnight.

9.1.6.11 Take the samples out of the oven and allow samples to cool in a desiccator (with silica gel as the desiccant) until the time of analysis.

9.2 ***Analysis and Final Report Generation:***

Note: This SOP will only address the portion of sample analysis that will allow the analyst to enter the instrument software, identify samples, log in samples, load samples onto the autoloader assembly and edit and output results. This SOP will not cover system configuration or method set up. Any question in regards to system configuration and method set up and any other questions on what is covered in this section are addressed in more detail in the LECO SC 444 Carbon/Sulfur Analyzer Instruction Manual.

9.2.1 At this point all untreated samples should be in 25x200 mm culture tubes and all treated samples should be in crucibles in the desiccator.

9.2.1.1 The untreated samples can remain as they are at this point. The treated samples should be weighed, the final weight recorded on the Soil TOC Pretreatment Log (Appendix 1) under the Final Wt. of Crucible and Soil, and then brought to a work area close to the instrument.

9.2.1.2 Scrape the sample from the sides of the crucible with a metal spatula. Grind the hardened sample to a fine particle size. Try to incorporate as much of the sample from the sides of the crucible into the final ground sample as possible.

9.2.1.3 Once all treated samples have been homogenized as in section 9.2.1.2, all the samples (treated and untreated) are ready for analysis on the LECO

SC 444.:

9.2.2 The main power to the LECO SC 444 should always remain on. The instrument will automatically go to standby mode after a short period of inactivity or after the analyst logs off of the instrument. NEVER TURN THE MAIN POWER OFF.

Note: The instrument requires one half hour to warm up.

Note: The LECO SC 444 is capable of analyzing sulfur and carbon simultaneously. This SOP will only address carbon. In those cases when parameter information is asked for sulfur the default settings are usually sufficient. If problems arise consult the LECO SC 444 Instruction Manual.

9.2.3 To bring the main menu on the screen simply touch the screen anywhere and the main menu will appear.

9.2.4 Select the METHOD icon. Using the arrow keys on the keyboard highlight the method to be used [TOC-SOIL Method, (High Level CARBON Analysis-Soil Matrix)]. Touch PRINT METHOD to receive a print out of the method information and the parameter values. Touch ESC.

9.2.5 From the main menu touch CALIBRATE. From the calibrate menu touch EDIT CALIBRATION. Touch SELECT ELEMENT (Carbon). Touch PRINT to receive a print out of the calibration information and the applicable range. Touch ESC to go to the calibrate menu, touch ESC again to return to the main menu.

Note: The calibration procedure is outlined in section 9.3. The instrument is quite stable and should not have to be recalibrated except when an ICV and/or CCV fails (greater than $\pm$ 10% of the true value) or when a different calibration range is desired.

9.2.6 From the main menu touch the ANALYZE icon. From the analyze screen touch SELECT ID CODE. The ID code screen will allow the analyst to add, delete or modify the ID codes. If the samples or standards are to be analyzed for the first time on this instrument touch ADD ID CODE.

Note: Although only samples are used to describe the log in procedure below, standards are treated in the same manner.

9.2.6.1 On the pop up screen fill in all pertinent sample information. If necessary, use all the ID code cells. Leave the % moisture at 0.0000. This will be edited later if the sample results are to be reported on a dry weight basis.

Note: Standards that are to be used for calibration will be added in the CALIBRATE menu and will automatically appear on the sample ID code screen. All other standards can be added here. Please see sections 9.3.1 through 9.3.1.3 for the calibration standard definition procedure.

9.2.7 If the samples have already been logged in, but the ID codes need to be modified or deleted, use the arrow keys to highlight the ID CODE and then touch MODIFY ID CODE or DELETE ID CODE respectively. If modifications are made the software will prompt the analyst to save changes. Select OK to save changes. If the highlighted ID code is to be deleted the software will prompt the analyst to confirm the decision.

9.2.8 Once all samples have been added to the ID code screen and all modifications, if any, have been made, highlight the ID code that is to appear first on the sample weights screen on the analyze menu and then touch ESC to return to the analyze screen.

9.2.8.1 Touch LOGIN SAMPLE. Place a combustion boat on the balance that is interfaced with the instrument. Tare the balance by pressing the (t) bar on the balance. Proceed to scoop the sample to be analyzed into the combustion boat so that it evenly covers the bottom of the boat. The weight of the sample should not be less than or greater than the least or greatest weight of standard used to calibrate the instrument (see section 9.3.2.2). Pick the middle calibration weight and use this as the nominal weight (i.e. 0.100 g).

9.2.8.2 Press PRINT on the balance. The weight will automatically appear on the sample weights list on the analyze screen.

Note: In order to analyze a blank, the weight has to be entered manually. Enter the nominal weight as the weight of the blank (ie. if the nominal weight is 0.100 g then enter 0.100 g as the weight of the blank).

9.2.8.3 Place the combustion boat on the combustion boat loader rack. Make sure that the position of the combustion boat on the rack is the same as its position on the sample weight list. The first position on the rack is the one on the top row closest to the analyst when the rack is in position on the autoloader assembly. Touch SELECT ID CODE on the screen to select the next ID code to appear on the sample weight list. Highlight the ID code by using the arrow keys to move to the ID code.

9.2.8.4 Continue as in sections 9.2.8.1 through 9.2.8.3 until all samples have been logged in and appear on the sample weight list.

9.2.9 On the analyze screen touch the ANALYZE box on the bottom of the screen. A pop up screen will appear. Make sure that the correct starting position on the rack is highlighted. Touch ANALYZE on the pop up screen to start the analysis.

9.2.10 To abort or reset the analysis during an analysis run, touch the ABORT ANALYSIS box on the bottom of the screen. On the pop up screen touch ABORT or RESET. Please see the LECO SC 444 Instruction Manual for further details.

Please note: If the analysis is aborted while a combustion boat is in the furnace the instrument will display and save the result, but the result will be incomplete. Whenever an analysis is aborted the instrument should be allowed to sit for 1 to 2 minutes and a blank should be run before sample analysis is resumed.

9.2.11 When the analysis run is complete (no more sample IDs or weights appear on the weights list of the analyze screen) touch ESC.

9.2.12 Touch the REPORTS icon from the main menu. Touch the RESULTS icon on the reports menu. A list of results will appear. Each result will have a number next to it that will correspond to the run number.

9.2.12.1 Touch the NEXT FIELD box on the bottom of the screen to toggle among the different screens available for report output format. Once the format is chosen use the arrow keys to move from one result to the next until it is pointing at the result to appear in the report. Touch INCLUDE RESULT to highlight that result. Continue until all the results to appear in the report are highlighted.

If an error is made and an incorrect result is highlighted, use the arrow keys to move the pointer to that result and touch EXCLUDE RESULT to remove the highlight.

9.2.12.2 Once all of the results that are to appear in the report have been highlighted touch PROCESS RESULTS. A pop up screen will appear. On this screen touch the box next to PRINT RESULTS and then touch OK. The results will print in the format chosen above.

9.2.13 After the results have been printed and are acceptable, touch ESC to access the reports menu. Touch ESC again to access the main menu.

9.2.14 If the results are to be reported on a dry weight basis continue. If not, go to section 9.2.14.3.

9.2.14.1 Touch the CALIBRATE icon on the main menu. Touch the EDIT MOISTURE icon on the calibrate menu. A list of results will appear. Each result will have a number next to it that will correspond with the run number. Using the arrow keys move the pointer to the result to be edited. Touch MODIFY MOISTURE. A pop up number pad will appear on the screen (use either the number pad on the screen or the number pad on the key board). Simply input the % moisture that corresponds to that sample: % moisture = 100 - % solids. % solids can be found on the Soil TOC Pretreatment Log. After all the moistures have been edited the software will ask you if the changes should be saved. Save the changes. The analyst may print the modified results now or go to the reports menu and proceed as in sections 9.2.11.1 through 9.2.11.2.

9.2.14.2 Touch ESC to access the reports menu. Touch ESC again to access the main menu.

9.2.14.3 The analyst can now log off the instrument by simply touching the LOGOFF icon.

Note: The software is capable of other applications, however the scope of this SOP does not allow for each of them to be discussed in detail. Please refer to the LECO SC 444 Instruction Manual for details on other system applications.

Note: The combustion boats are EXTREMELY HOT after ignition. In order to avoid being burned allow the boats to cool in the boat collection bin. When the boats have cooled, the collection bin can be removed from the autoloader assembly and the boats can be put aside until they can be cleaned for later use.
Note: The combustion boats can be cleaned and reused up to four times. If the boat is difficult to clean, discard.

9.2.15 RLIMS Report Generation

9.2.15.1 Enter results into RLIMS and generate the RLIMS sample reports.

9.3 ***Instrument Calibration:***

The instrument will only need to be calibrated when an ICV and/or a CCV fails or when a different calibration range is desired. During the soil TOC method development the instrument was calibrated with KHP (47% carbon). It is recommended that KHP be used for future calibrations if necessary. If a higher or lower calibration range is desired a higher or lower percent carbon standard should be used.

9.3.1 Touch the screen to activate the main menu. From the main menu touch the CALIBRATE icon. From the calibrate menu touch the DEFINE STANDARDS icon. From this screen standards can be added, deleted and modified.

9.3.1.1 To add a calibration standard to the list touch ADD STANDARD. A pop up window appears which allows the analyst to enter a new standard ID code, lot number, % sulfur of sulfur standard and % carbon of carbon standard. When all the values have been entered, touch OK to add the standard to the standards list.
CANCEL will abort this process and will return the analyst to the define standards screen.

Note: A standard can only be defined once. The heading of ID code #2 is "Lot Number." The heading of ID code #3 is "Standard."

9.3.1.2 To delete or modify a calibration standard use the arrow key to highlight the standard then touch DELETE STANDARD or MODIFY STANDARD. A pop up window will appear which will confirm the deletion or display the ID code for editing.

9.3.1.3 Touch ESC to access the calibrate menu. Touch ESC again to access the main menu.

9.3.2 Touch the ANALYZE icon.

9.3.2.1 Continue as in sections 9.2.5 through 9.2.12. The calibration standard ID codes will appear on the ID code list automatically. Any modifications to the these standards have to be made through the define standards menu.

9.3.2.2 The calibration will consist of 4 weights of calibration standard (i.e. approximately 0.050 g, 0.075 g, 0.100 g and 0.150 g). Each of these weights will be analyzed three times. Therefore the calibration run will have 12 combustion boats for analysis.

9.3.2.3 After the analysis of the calibration standards, touch ESC. From the main menu touch the CALIBRATE icon. From the calibrate menu touch STANDARD CALIBRATION. A list of results will appear. Each result will have a number next to it that will correspond to the run number. Average the three standard results together for each calibration weight and choose the single result that most closely corresponds to this average. Use the arrow keys to move the pointer to this result and touch INCLUDE RESULT. Continue until 4 results have been included (one for each calibration weight). Touch PROCESS RESULTS.

A pop up window will appear with the calibration curve on it (touch SELECT ELEMENT to toggle between the curve for sulfur and carbon). Touch ESC. The software will prompt the analyst to save the calibration. Save the calibration. The software will prompt the analyst for the type of curve and intercept. Choose linear and fixed respectively. The software will prompt the analyst to enter the intercept. At this point the intercept should be entered as 0.0000. The fit of the curve calculated by the instrument should be less than 0.005.

Note: It may be necessary to perform the same calibration more than once. When the calibration range changes significantly error messages will occur that indicate that the infrared detectors are out of range. Calibrate the instrument with the results that have error messages associated with them, but then perform the calibration again so that the out of range error message will not occur.

9.3.2.4 Touch ESC until the main menu is on the screen. Touch ANALYZE. Touch SELECT ID CODE. If a blank has not been added to the ID code list, add it now (see section 9.2.6). Analyze 3-5 blanks (see sections 9.2.7 through 9.2.13 on how to analyze samples). The blank weights should correspond to the middle weight of the standard used for calibration (i.e. 0.100 g). After all the blanks have been analyzed go to the standard calibration menu (see section 9.3.2.3). Recalibrate the instrument using the previous standard values and the new intercept (the average value of the blanks analyzed above). Save this calibration. This is the new instrument calibration.

The software converts an absorbance value to percent carbon based on the calibration. For each sample the raw data will include run sequence, ID code, weight of sample analyzed (grams), percent sulfur and percent carbon. The Soil TOC Pretreatment Log will include pre-analysis data such as initial weights of samples and spikes added to samples (if any) and final weights of samples that are either treated with 5% H_3PO_4 or remain untreated.

Note: For those samples that are NOT treated with H_3PO_4, the initial weight of crucible and soil on the Soil TOC Pretreatment Log is also the final weight of crucible and soil.

Note: The Final Wt. of Crucible and Soil Column on the Soil TOC Pretreatment Log will always have weights in it if the soils are treated with 5% H_3PO_4.

10. CALCULATIONS:

10.1 Treated Sample Result Calculation

$$\textbf{Result} = \frac{\textbf{S}}{\textbf{CF}}$$

where: S = Sample Result, % C

CF = Correction Factor

$$= \frac{(\text{Initial Wt. of Crucible and Soil}) - (\text{Wt. of Crucible})}{(\text{Final Wt. of Crucible and Soil}) - (\text{Wt. of Crucible})}$$

10.2 Percent Recovery (%R) Calculations for ICV, CCV, SCS and LCS.

$$\%R = \frac{\text{Found Value, \% (C)}}{\text{True Value, \% (C)}} \times 100$$

10.3 Percent Recovery (%R) Calculation for Matrix Spike

$$\%R = \frac{F}{C} \times 100$$

where: F = Found Value From Instrument, % C
C = Calculated Value, % C

$$C = \frac{\text{Wt. of Sample}}{\text{Total Wt}} \times (\text{\%C in Sample}) \quad (+)$$

$$\frac{\text{Wt. of Spike Added}}{\text{Total Wt.}} \times (\text{\%C in Spike})$$

Wt. of Sample = (Initial Wt. of Crucible and Soil) - (Wt. of Crucible)

Total Wt. = (Final Wt. of Crucible and Soil) - (Wt. of Crucible)

Note: Two weights will appear in the Initial Wt. of Crucible and Soil column if the sample is spiked. The first weight will be the crucible and the soil. The second weight will be the crucible, soil and the spike added. The weight of the spike added will be the difference of these two numbers.

10.4 Calculate the duplicate differences as;

$$\mathbf{RPD\% = \frac{|S - D|}{(S + D)/2} \times 100}$$

where:

RPD = Relative percent difference.
S = Sample Result in % C.
D = Duplicate Result in % C.

11.5.9 QUALITY CONTROL SUMMARY:

AUDIT	FREQUENCY	LIMIT
LCR	As required	Fit ≤ 0.005
SCS	Beginning	To Pass
QCS (LCS or SRM)	Per Batch	To pass
ICB	Beginning	0 ± 0.1%
ICV-CS		100 ± 10 %
CCV-CS	End of analysis and once every 20 samples	100 ± 10 %
CCB		0 ± 0.1%
LD (Duplicate)	Per site or 5 % of 20 samples	RPD ≤ 20%
LFM (Spike)	Per site or 5 % of 20 samples	100 ± 20%

11. DATA REPORTING:

11.1 Results are reported to a maximum of three significant figures and one decimal as follows;

X.X, XX.X, XXX,

11.2 The reporting limit for this method is 1% C. Any results below those reporting limits will be provided as specified by the customer.

11.3 Raw data including computer print outs of peak areas and bench sheets are to be submitted with the data package.

11.4 Any irregularities in labeling or preservation of samples, or unusual observations must be documented in a case narrative and brought to the attention of the data user.

11.5 All electronic records associated with any data package must be archived.

12. PREVENTIVE MAINTENANCE:

Please refer to the LECO SC 444 Instruction Manual under the Maintenance, Diagnostics and Service sections for trouble shooting and routine preventive maintenance.

13. REFERENCES:

12.1 Black, C.A., et al. 1965. Organic Carbon. Methods of Soil Analysis, Part 2. Chemical and Microbiological Properties. American Society of Agronomy. Pp. 1367-1378.

12.2 Black, C.A., et al. 1965. Total Carbon. Methods of Soil Analysis, Part 2. Chemical and Microbiological Properties. American Society of Agronomy. Pp. 1346-1366.

12.3 LECO. 1992. LECO SC 444 Sulfur/Carbon Analyzer Instruction Manual. Pp. 4-1 to 10-11.

12.4 Nelson, D.W. and Sommers, L.E. 1982. Total Carbon, Organic Carbon and Organic Matter. ASA-SSSA, Methods of Soil Analysis, Part 2. Chemical and Microbiological Properties. Pp. 542-573.

12.5 Nommik, Hans. 1970. A Modified Procedure for Determination of Organic Carbon in Soils by Wet Combustion. Soil Sci. 111. Pp. 330-336.

ATTACHMENT 1

ANALYST _______DATE ________

SOIL TOC PRETREATMENT LOG

SAMPLE	VESSEL #	INITIAL		FINAL	% SOLID	INORGANIC (C) TEST		VOL OF ACID ADDED	VOL OF H_2O ADDED
		WT OF CRUCIBLE (GRAMS)	WT OF CRUCIBLE AND SOIL (GRAMS)	WT OF CRUCIBLE AND SOIL (GRAMS)		POS/NEG	COMMENT	(ML)	(ML)

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1 May 2001

Mr. Sam Borries
On Scene Coordinator
U.S. Environmental Protection Agency
77 West Jackson Boulevard, SE-5J
Chicago, Illinois 60604

TDD No.: 0103-002

Subject: Allied Paper Site
Quality Assurance Project Plan and Field Sampling Plan

Dear Mr. Stimple:

Roy F. Weston, Inc. (WESTON) is pleased to submit for your review five copies of the Quality Assurance Project Plan and Field Sampling Plan, Revision 0 for the Allied Paper Site in Kalamazoo, Michigan.

Should you have any questions or require additional information, please feel free to contact us.

Very truly yours,

ROY F. WESTON, INC.

Richard H. Mehl, Jr.
Site Manager

Enclosure

cc: Brad Stimple, U.S. EPA
Beth Reiner, U.S. EPA
Tom Short, U.S. EPA
Chuck Roth, FIELDS
Brian Von Gunten, MDEQ (2 copies)
John Kerns, Spectrum Consulting Services, Inc.

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18 May 2001

Mr. Sam Borries
On Scene Coordinator
U.S. Environmental Protection Agency
77 West Jackson Boulevard, SE-5J
Chicago, Illinois 60604

TDD No.: 0103-002

Subject: Allied Paper Site
Quality Assurance Project Plan and Field Sampling Plan Amendment

Dear Mr. Borries:

Roy F. Weston, Inc. (WESTON) is pleased to submit for your review five copies of the Quality Assurance Project Plan and Field Sampling Plan Amendment for the Allied Paper Site in Kalamazoo, Michigan.

This Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) Amendment modifies those sections of the Allied Paper - Kalamazoo River Project Quality Assurance Project Plan (WESTON, 1 May 2001) based on U. S. Environmental Protection Agency (U.S. EPA) and Michigan Department of Environmental Quality (MDEQ) comments.

A.7 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

Each of the sample collection activities described in this Removal Assessment Work Plan address sample collection objectives outlined in the Draft Kalamazoo River 2001 Removal Assessment FIELDS Proposal (20 March 2001). Two of the five data collection objectives (FIELDS) have been modified:

- Removal Volume Estimation - This sampling event will refine the volume estimation of contaminated sediment.

- Provide Data for Cost Estimation - Data from analytical results will aid in the definition and evaluation of alternative remedies and provide criteria for a more refined cost analysis.

B.4 ANALYTICAL METHODS REQUIREMENTS

B.4.1 Analytical Laboratory Procedures

PCB Aroclors will have a detection limit of 0.033 mg/kg.

2.2.1.2 Stage Two Radial Sampling

Stage two will implement a modified radial grid around selected "hot spots" (Figure2-2) determined from analytical results received from stage one sampling. Sampling will provide data for correlation analysis and to determine "hot spot" size. The number, location, and grid configuration of the Stage 2 sampling will be based on the results of Stage 1. The general approach for the Stage 2 sampling is as follows, but may be modified based on Stage 1 results.

Six cluster areas will be collected from instream sediment and exposed sediment for a total of approximately 256 sample locations. The radial clusters will likely encompass instream sediment, exposed sediment, and floodplain soil. For instream samples, cores will be collected with predetermined distances of 5 feet (ft) 10 ft, 20 ft, 80 ft, 160 ft along river flow and 5 ft, 10 ft, and 20 feet across river flow. For exposed sediment and floodplain samples, cores will be collected with predetermined distances of 5 feet (ft) 10 ft, 40 ft, and 160 ft from the cluster center, in eight directions. Radial clusters will be randomly allocated to both high concentration and low concentration areas. Soil and sediment samples will be collected following intervals; 0-6 in., 6-12 in., 12-24 in., 24-36 in., 36-48 in., and 48-60 in. Samples will be collected to refusal or until native soil is visible. If sufficient sample volume exists from the first interval (0-6 in.) of the instream sediment samples, the top 2 in. (0-2 in.) from that 0-6 in. interval may be collected and submitted for PCB analysis. Otherwise, the entire 0-6 in. interval will be used for the sample. Samples will be placed into an 8-ounce clear wide mouth glass sample jar with a teflon-lined cap and cooled to 4°C, and analyzed for PCBs (aroclors). FIELDS will flag or mark each location via GPS.

Mr. Sam Borries -3- 18 May 2001
U.S. Environmental Protection Agency

Should you have any questions or require additional information, please feel free to contact us.

Very truly yours,

ROY F. WESTON, INC.

Richard H. Mehl, Jr.
Site Manager

Enclosure

cc: Gail Nabasny, U.S. EPA
Brad Stimple, U.S. EPA
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Tom Short, U.S. EPA
Chuck Roth, FIELDS
Brian Von Gunten, MDEQ (2 copies)
John Kerns, Spectrum Consulting Services, Inc.